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ECONOMIC AFFAIRS

EKO: ECONOMICS AND ORGANIZATION
OF INDUSTRIAL PRODUCTION

No 6, June 1985

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CONTENTS

Prospects for Siberia

For the All-Union Conference on the Development
of the Productive Forces of Siberia

Siberian Industry Changed, Intensified (A. G. Granberg) (3-27)	1
Tyumen Obkom Secretary Altunin Interviewed (27-32)	17
Siberian Petroleum Industry Described (R. I. Kuzovatkina) (33-35)	21
Northern Gas Deposits Discussed (K. Sidorenko) (35-37)	24
Recent Petroleum and Gas Complex Achievements Related (B. P. Orlov, V. N. Kharitonova) (37-51)	26

Scientists Predict Siberian Development (A. A. Trofimuk, A. S. Alekseyev, A. V. Rzhanov, S. S. Kutateladze, Ye. I. Shemyakin, K. I. Zamarayev (51-65)	39
In the USSR Academy of Sciences	
Academy of Sciences Elects New Members (66-78)	47
Work of Magazine Reported (78-82)	57
Economics of Scientific and Technical Progress	
Strategy for Competitive Products Revealed (83-84)	61
Electrical Equipment Industry Minister Interviewed (L. Shcherbakova) (84-91)	63
Importance of Designs Stressed (V. I. Radin) (92-100)	70
Economics of Design Work Discussed (E. K. Strelbitskiy) (100-103)	77
Importance of Customer in Planning Stressed (G. S. Kurbatova) (104-108)	81
Importance of Economical Technology Stressed (F. K. Makarov) (108-116)	85
Activity of Interelektro Organization Described (L. Shcherbakova) (116-122)	92
We Pose the Problem	
Usacheva Article Discussion Reported (123-144)	98
Socioeconomic Problems of Labor	
Shchekino Method Continues To Work (G. I. Grotseskul) (145-151)	114
Technical Progress Increases Labor Productivity (G. R. Fridman) (152-158)	119
Demographic Factors Affect Labor Resources (Ye. M. Bubnova) (159-166)	126

Responses

To the Article by V. Ya. Belenkiy, "From Hiring and Firing
to Management of Personnel," EKO, No 9, 1984

Responsibility for Personnel Clarified (A. A. Tkachenko) (167-169)	132
Personnel Policy Experiment Urged (A. V. Shteyner) (169)	135
Improvement of Personnel Work Urged (I. Andrianov) (169-170)	136
Personnel Services Related to Management (B. M. Yarnov) (170-171)	137

Digest

(pp 151, 171) (not translated)

Social and Political Topics

History of Kola Peninsula Sketched (Yuriy Voronov) (172-197)	139
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Among Books

Handling of Conflicts Discussed (G. A. Denisov, G. Ye. Zhuravlev) (198-203)	159
Book on Social Psychology Reviewed (V. V. Chichilimov) (203-206)	164

Scientific Life

Scientific Economic Society Leader Interviewed (Ye. Kolosova) (207-215)	168
Role of Psychology in Economics Investigated (A. I. Sadikov) (215-218)	175

Postscriptum

Worker Rivalry Satirized (Yegor Belyayev) (219-222)	179
In Preparation for the Next Issue (222) (not translated)	

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SIBERIAN INDUSTRY CHANGED, INTENSIFIED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 6, Jun 85 pp 3-27

[Article by A. G. Granberg, corresponding member of the USSR Academy of Sciences, Institute of Economics and Organization of Industrial Production of the Siberian Branch of the USSR Academy of Sciences (Novosibirsk): "Structural Progress and Intensification of Industry in Siberia"]

[Text] The accelerated industrial growth of Siberia is an important element in the economic strategy which is being implemented in keeping with the decisions of the party congresses and state plans for economic and social development. During past decades in Siberia the country's main fuel and energy base has been created, large territorial production complexes of national economic significance have been formed, dozens of large industrial enterprises have been put into operation, and regions with the richest natural resources are being assimilated. Next in line are more and more new large-scale projects. It is not surprising that in the minds of millions of people Siberia is closely associated with rapid and stable economic growth.

These ideas are confirmed by the overall indicators of the dynamics of industrial production. From 1960 through 1984 the gross output of Siberian industry increased approximately 5.1-fold while in the country as a whole it increased 4.6-fold. Siberia's share in the unionwide industrial production also increased: under the 11th Five-Year Plan for the first time it reached 10 percent (in current prices).

Let us emphasize that the more rapid growth of Siberian production is effective from the national economic standpoint. Moreover it has become a necessary condition for the sufficiently rapid growth of the Soviet economy. This conclusion is reached by a comparison of the resources and capabilities of various regions of the country. As calculations from interregional interbranch models of the national economy show, the optimal average annual rate of increase in production in Siberia should be 120-140 percent of the unionwide level.¹ In reality the growth rates of Siberian industry have not yet become this much higher. Under the 8th Five-Year Plan it amounted to 121 percent, the 9th--117, the 10th--115 percent and under the 11th Five-Year Plan it dropped even more.

One of the reasons for the reduction of the advantage for Siberia in the rates of industrial development is the overall reduction of the rates of development of USSR industry as compared to the 1960's and the first half of the 1970's, and especially the retardation of the growth of capital investments. The possibilities have not been as great for making progress in the distribution of production and the tendencies toward inertia have become stronger, which contribute to concentrating production in old industrial regions.

But this explanation is apparently inadequate, especially for making prognoses. It is necessary to see what is hidden behind the overall dynamics of Siberian industry and to reveal the factors that contribute to acceleration of the development of the region and those that retard it. Let us turn to an analysis of the main changes in the branch structure of Siberian industry and the changes in its functions in the national economic complex.

The More Rapid Growth of Siberian Industry and Structural Changes

Intensification presupposes profound changes in the structure of the economy. This process differs essentially in regions that are in different stages of intensification and are performing special functions in the unionwide territorial division of labor.

Frequently regional peculiarities give rise to structural changes which at first glance seem to contradict the overall patterns but in fact are in a dialectical correspondence with them. This kind of exception to the rule is perhaps typical more of Siberia than of any other large region.

Let us consider first the relative dynamics of the extracting and processing industries. The overall pattern of evolution of the branch structure of industry is a regular increase in the share produced by the processing branches in the overall output. This pattern is related to the reduction of expenditures of primary resources per unit of final output and the deepening of inter- and intrabranh division of labor which is accompanied by an increase in intraindustrial circulation. Because of the savings and extensive dissemination of energy- and material-saving technologies there is a quite realistic possibility of an absolute reduction of production in the traditional branches of the processing industry.

The concepts of the economic development of Siberia which emerged 15-20 years ago also envisioned preferential development of the complex of processing branches with relatively moderate rates of development for the extracting industry. The basic conclusion (along with the motive of improving the structure of production in favor of the "progressive" branches and the relative reduction of the importing of unprocessed raw materials) consisted in that specialization in the extracting productions with their relatively low rates of growth was incompatible with the notion of accelerated development of Siberia.

Reality subjected many of the predictions of the structural progress in Siberian industry to significant adjustments. Beginning in the second half of the 1960's the extraction industry of Siberia sharply accelerated its development, mainly because of enlisting new resources of petroleum and gas

from the northern regions of the Western Siberian plain. Under the 10th and 11th Five-Year Plan the growth rates of the extraction industry in Siberia are surpassing those of the processing industry and have been significantly higher than the rates of all of the country's industrial production (Table 1). As for the share of the extraction branches in the gross output of Siberian industry, it is increasing not only because of the rapid growth of production, but also because of the increase in prices of fuel, electric energy, mineral raw material metal ore and timber. There was an especially significant increase in prices in 1982. Therefore the share of the extraction branches in the output of Siberian industry (and also the share of Siberia in unionwide production) in current prices is appreciably higher than in comparable prices of past years (Table 2).

Table 1--Average Annual Rates of Increase in Production in Extraction and Processing Industry of USSR and Siberia in Various Periods, %

	<u>1968- 1970</u>	<u>1971- 1975</u>	<u>1976- 1980</u>	<u>1981 1982</u>
Extraction				
USSR	5.2	4.6	1.9	1.0
Siberia	7.8	8.1	5.8	4.4
Processing				
USSR	8.4	7.7	4.6	3.4
Siberia	9.4	8.3	4.4	2.9

Table 2--Share of Extraction Industry in Industrial Output of USSR and Siberia, %

	<u>1970</u>	<u>1975</u>	<u>1980</u>	<u>1983</u>
In prices of corresponding years				
USSR	8.9	8.1	7.3	9.0
Siberia	16.7	17.1	17.3	28.0
In prices of 1 July 1967 (calculated)				
USSR	9.4	8.9	8.0	7.5
Siberia	18.8	18.7	19.9	21.0

Now the share of the extraction branches in Siberian industry is almost 3 times higher than in unionwide industry. And this is not a matter of the "backwardness" of the branch structure of the Siberian economy, but of the increasing loads on the regional economic complex in the interests of satisfying the country's needs for fuel and raw material. N. A. Tikhonov takes note of this fact as one of the large achievements of the Siberian economy.²

The aforementioned dynamic and structural peculiarities of the industrial development of Siberia are economically expedient because of the radical changes that have taken place in the territorial structure of the extraction and consumption of fuel and raw material, primarily petroleum and gas. A retardation of the increase in the extraction of hydrocarbon raw material in

the European part of the country beginning in the second half of the 1970's gave way here to a forced reduction of the levels of extraction. But, as before, three-fourths of the demand for fuel and energy are concentrated in this zone. Siberia has begun to cover an ever-increasing part of the increase in the unionwide demands, and now it not only produces all of the increase, but compensates for the reduction of the extraction of petroleum and gas in other regions (under the current five-year plan approximately 13-14 million tons of petroleum and 3-4 billion cubic meters of natural gas annually). And while in the country the extraction of hydrocarbon raw material increased threefold during 1966-1983 (from 496.2 to 1,514.6 million tons of conventional fuel), in Siberia it increased almost 600-fold! In 1984 62 percent of all the petroleum (with gas condensate) and 54 percent of the natural gas were extracted here. It was the petroleum and gas industry that began to play the leading role in the more rapid growth of Siberian production. The following calculation presents it clearly. If one excludes the petroleum and gas industry from the gross output, one sees that the growth rates of the other branches of industry in the country in Siberia came very close together even under the 9th Five-Year Plan, and beginning with the 10th Five-Year Plan in Siberia they were even lower than the unionwide levels.

The gradual increase in Siberia's role in the unionwide production is also typical of many other branches of the extraction industry. Thus during the 1970's Siberia's proportion of the extraction of coal increased from 28.6 to 31.4 percent, and the shipment of timber--from 24.2 to 26.4 percent. But as distinct from the petroleum and gas industry, this was caused not so much by high rates as by stabilization and even an absolute reduction of the extraction in other regions.

Table 3--Branch Structure of Gross Industrial Output of Siberia
(in 1975 Prices), % of Total

	<u>1970</u>	<u>1980</u>	<u>1983</u>
Electric energy	5.4	5.2	5.0
Fuel	12.6	17.0	18.5
Ferrous metallurgy	5.0	3.8	3.6
Chemical and petrochemical	6.6	7.3	7.7
Machine building and metal processing	19.8	23.4	24.2
Timber, wood processing, and pulp and paper	9.3	6.9	6.8
Construction materials industry	4.4	3.7	3.4
Light	10.8	10.7	9.9
Food	17.4	11.9	10.3
Other branches	8.7	10.1	10.6

Let us turn now to the structural changes that have taken place in Siberia industry in the large branches (see Table 3). As compared to unionwide industry, in Siberia there has been an appreciably greater proportion of the fuel-energy and timber complexes and a lower proportion of machine building, light and the food industry. In other words, the branch structure of industry has shifted in the direction of the local and intermediate stages which are related to the extraction and processing of natural raw material. This major structural peculiarity of Siberian industry is stable. It is not only

historical conditioned, but also corresponds basically to the modern requirements for efficient distribution of production and reflects Siberia's most important economic advantage--the extremely rich energy, mineral, timber and water resources. But there are a number of disproportions in the industrial complex of Siberia. They can be divided into two groups: 1) the inadequate level of development of productions for processing fuel and raw material which are highly effective from the national economic standpoint--branches of unionwide specialization; 2) the arrears of the support industries, primarily electric energy, ferrous metallurgy, the construction materials industry and machine building. We shall discuss the first group separately, and then we shall take note of the main bottlenecks in the industrial complex of Siberia.

The shortage of electric energy in Siberia, where more than three-fourths of the potential energy resources are concentrated, is an economic paradox which causes no small amount of harm to the national economy. Just direct losses of products because of forced limitation of electric power consumption at production facilities that are already in operation exceed 3 billion rubles a year. The long-term consequences involve a slowing up of the planning and construction of new energy-intensive productions which have no equals in other regions in terms of their technical and economic indicators. The reasons for the unfavorable situation have been analyzed in detail in the press. During the 1970's the output of electric energy in Siberia annually increased by 7.4 billion kilowatt-hours--15.7 percent of the unionwide increase. In 1981-1982 the annual amount of growth increased to 9.9 billion kilowatt-hours, but in Eastern Siberia the absolute amount of output decreased. There was a special shortage of energy in 1982. In subsequent years the situation was rectified because of the considerable increase in the output of electric energy from the GES's of the Angaro-Yenisey Cascade (the cyclical increase of the water flow and the introduction of the equipment at the Sayano-Shushenskaya Station), the expansion of the capacities of the heating stations (first and foremost the Surgutskaya GRES which uses gas fuel), and the transfer of electric energy from the Urals and from Kazakhstan. The state plan for 1985 envisioned the startup of capacities of the first large electric station according to the KATEX program--at the Berezhovskaya GRES-1.

Ferrous metallurgy is in a difficult position. The repeated decisions concerning the creation of a new metallurgical base in the eastern part of the country have remained unrealized, the electric steel-smelting and ferrous alloy plants envisioned by the plans have not been constructed, and the reconstruction of the KMK and the expansion of Zapsib are being delayed. As a result, under the 10th Five-Year Plan the production of metal decreased in terms of the absolute quantity without an appreciable improvement in its quality. The importing of rolled ferrous metals, metal wares and pipes from other regions has increased.

Machine building, although it occupies first place in the industry of Siberia in terms of the gross output, is still poorly oriented toward the needs of the region, including the branches of unionwide specialization. They do not produce enough technical equipment that is adapted for work under the conditions of the Siberian North (mining, drilling, transportation and construction equipment, and so forth). Approximately 70 percent of the

products are shipped to other regions, which worsens the shortage of labor resources and metal. At the same time three-fourths of the deliveries of machines and equipment are provided through imports.

As was noted, the more rapid increase in industrial production in Siberia during the second half of the 1970's was achieved mainly because of the petroleum and gas industry. Let us add that the range of branches and productions which are developing more rapidly in Siberia than in the country as a whole is gradually narrowing. The last to fall out of this range were ferrous metallurgy, the chemical industry, electric energy engineering and a number of subbranches of machine building. The policy for the distribution of capital investments is contributing a good deal to this.

Industry in Siberia is receiving a growing proportion of unionwide capital investments. According to the five-year plan they are increasing by almost 40 percent. But hardly all of the increase in capital investments is being absorbed by the Ministry of the Petrochemical Industry and the Ministry of the Gas Industry. Even the base and effective branches in whose development it is necessary to increase capital investments (electric energy, ferrous metallurgy and the petrochemical industry) are not receiving significant increases, and in many industrial ministries the capital investments are decreasing in absolute terms.

With respect to predictions about the role of Siberia in the unionwide division of labor one conclusion seems indisputable. Siberia will increase its raw material and energy potential, being the place of concentration of an ever-increasing proportion of the extraction of fuel and other kinds of mineral resources and timber. In the future, apparently, it will produce no less than three-fourths of the hydrocarbon raw material and 50-60 percent of the coal. But will Siberia be able to retain sufficiently high and increasing rates of development primarily as a result of the extraction industry? In order to answer this question let us return to an analysis of the interrelations between the regional and unionwide rates.

It is clear that as the proportion of regional production increases in the national economy (in one branch or another or one group of products or another, and so forth), the regional rate approaches the unionwide rate. This is the tendency that is typical of the fuel industry and a number of other extraction productions in Siberia. Here is a calculation that illustrates the influence of this tendency on the ratio between the rates of Siberian and unionwide industry. For example, in order for the region to increase its share of the unionwide extraction of fuel during the past 10 years from 30 to 50 percent with an average rate of increase of the extraction of fuel in the country of 2 percent it needed a rate at the level of 9.3 percent (4.65 times higher). But in order to subsequently increase Siberia's share to 80 percent during the next 20 years and to retain the unionwide rate the region will have to maintain a rate of 3.3 percent (only 1.65 times more rapid). This is lower than the expected gross rate of industry in the country.

As was noted at the session of the USSR Supreme Soviet in November 1984, 60 percent of the increase in the needs of the national economy for fuel and energy resources is now being satisfied through saving on them. This tendency

should be strengthened and extended to other kinds of natural raw material, as a result of which the growth of the extracting industry will be slowed down. Therefore it seems inevitable for there also to be a reduction of the rates of development of the extraction industry in Siberia because of the high proportion it has reached in the overall unionwide production. The conclusion is apparently clear. Industry in Siberia cannot continue to develop at more rapid rates simply because of the extraction industry. Even in the near future a necessary condition for accelerated development of industrial production in Siberia will be a shifting of the center of gravity to the more dynamic branches of the processing industry.

The Main Direction of Unionwide Specialization

A key factor in increasing the national economic effectiveness and rapidly developing industry in Siberia is a changeover to deep and comprehensive processing of raw material and an increase in the region's share in the unionwide production of energy-, material- and water-intensive products of ferrous metallurgy and the chemical, petrochemical, wood-processing and pulp and paper industries, and also in the production of progressive construction materials. This is not a new problem. It was formulated even in the prewar plans and was raised again in the decisions of the 24th, 25th and 26th party congresses. The Main Directions for the Economic and Social Development of the USSR During 1981-1985 and the Period Up to 1990 note not only the need for concentration in the eastern regions (Siberia and Kazakhstan) of energy-intensive productions, but they also set the requirement, not to locate new or expand existing energy-intensive and water-intensive productions in the European regions."³ But the problem is not being resolved consistently enough.

In terms of many of the most important products that are processed from raw material extracted in the region Siberia's proportion in the unionwide production is almost not increasing and sometimes it is even decreasing. Thus from 1965 through 1982 Siberia's share in the output of mineral fertilizers decreased from 5.9 to 2.1 percent, plastic and synthetic resins--from 16.4 to 10.7 percent, chemical fibers--from 17.8 to 11.5 percent, and paper--from 3 to 1.9 percent. For the chemical and petrochemical industry Siberia's share decreased from 13 to 9.2 percent, in spite of the increase in the branch's share in the industrial output of the region. Siberia's proportion of the processing of electric energy, the production of ferrous metals, wood processing and the pulp and paper industry have almost not increased.

The economic effect from the concentration in Siberia of thorough processing of fuel and raw material is determined, above all, by two circumstances: first, the savings on transportation in all technological categories right down to the final consumption and, second, the possibilities of comprehensive utilization of natural resources and reduction of losses during extraction, shipment and processing with a combination of productions in the industrial centers and TPK's. But if one can speak about implementing one variant or another when it comes to conditions for transportation, there are no alternatives to solving the problem of losses: only in the places of concentration of the extraction of raw material is it possible to salvage casing head and exhaust gases, wastes from ore and coal enrichment,

multicomponent ores, slags, ash, tailings, exposed and mixed rocks, and so forth. The development of waste-free productions in Siberia is at the same time a reliable means of protecting the environment.

The efficiency of concentrating in Siberia deep and comprehensive processing of raw material is confirmed both by branch methods taking into account the positive and negative regional peculiarities and by modeling the national economic consequences of this distribution. Let us emphasize that we are speaking not about regional (Siberian) problems, but about one of the radical national economic problems. Its solution requires coordinated actions on a national economic scale. As we know, the increasing spatial separation between the production and consumption of fuel, raw material and products from their processing is a consequence of the continuing expansion in the European part of the country of the capacities of energy-intensive ferrous and nonferrous metallurgy, the chemical industry and other branches. As a result there are increased shipments from Siberia to the West of fuel and raw materials, and in the opposite direction--products resulting from processing these.

The flow of fuel shipped over a distance of 3,000-5,000 kilometers has exceeded 800 million tons of conventional fuel a year. Each new main gas line from the northern Tyumen deposits (and six of these main lines are being constructed under the 11th Five-Year Plan alone) significantly increases this flow. Serious transportation problems are created by shipping from Siberia 25 million tons of timber material, a large proportion of which is round timber. At the same time 20 million tons of construction materials and a good deal of ferrous metals and chemicals are shipped to Siberia from the European regions.

The national economy sustained especially large losses because of the slow development in Siberia of enterprises for processing hydrocarbon raw material. On an average in the Ob area a number of plants are in operation for processing casing head gas (GPZ). In and of itself this fact is a large achievement. But still approximately one-third of the casing head gas is burned in torches in petroleum industries, and the products of GPZ (except for dry gas) are not utilized efficiently enough. In their totality GPZ can produce up to 5 million tons of nonstable benzene or a so-called broad fraction of hydrocarbons, and also 2-3 million tons are received as a result of stabilization and hot separation of petroleum before it is transferred along the main pipelines. According to the plans, the most valuable raw materials should be processed at the Tobolsk Petrochemical Combine, to which a special pipeline has been led. But because of the arrears in its construction and as a result of the startup of capacities for organic synthesis in the Volga region and in other Western regions, the broad fraction will have to be shipped in tank cars on the overloaded Tobolsk-Tyumen Railroad and then along the Trans-Siberian over the Urals, and when there is no transportation it will have to be pumped into petroleum lines. The planned Tobolsk-Povolzhye products line for transferring broad fractions will not solve the problem of distributing petrochemical productions, particularly that for synthetic rubber. The main thing that must be taken into account: in order to obtain a ton of rubber it is necessary to ship up to 3 tons of raw material and 5-7 tons of conventional fuel. If the capacities continue to be introduced in the European regions, the transportation will "eat up" the lion's share of the

effect of the extraction of chief fuel and hydrocarbon raw material in Western Siberia.

In the future up to the year 2000 in Siberia it will be necessary to carry out a large-scale program for the development of productions for processing fuel and raw material. In the near future at the Tobolsk Combine they will put into operation a central gas-fractioning installation which will produce butane and pentane--raw material for obtaining monomers, and also propane. It is further intended to produce monomers (butadiene and isopentane), which in order to obtain the final product (rubbers and so forth) have to be shipped to the European regions of the country. It is planned to extend the technological cycle of the Tobolsk Combine to the point of producing final products.

Petroleum and gas resources of Western Siberia are now being used to operate petroleum processing and petrochemical complexes in Omsk, Achinsk, Angarsk and outside of Siberia. Extremely large installations have been introduced for producing polypropylene and methanol at the Tomsk Chemical Plant; it is intended to complete the first section for production of formalin and carbamide resins. The gas condensate of Urengoy and Yamburg is becoming a large new source of obtaining motor fuels and various chemical products; its extraction can reach several tens of millions of tons. New GPZ's are needed in the petroleum-processing regions. Additionally, it will be necessary to arrange on a large scale the extraction from natural gas of such highly valuable components as ethane, butane and others. In the near future because of the expansion of petroleum extraction and more complete salvaging of casing head gas and the assimilation of gas condensate deposits, the resources of the broad fraction of hydrocarbons will increase at least threefold, which will require the expansion of the Tobolsk Petrochemical Combine and the construction of new ones. Large-scale production of nutritive protein from methane is being developed; from the byproducts from the processing of sulfurous petroleum it is expedient to organize the output of sulfur products.

In recent years dry casing head gas has become the main source for the expansion of electric energy in Western Siberia (the Sirgutsкая GRES, and in the future the Nizhnevartovskaya GRES and others); a number of electrical stations are planned to use low-pressure natural gas which cannot be efficiently transported over long distances. The main gas lines can be a large source of electric energy as a result of salvaging the discharged heat from the gas-pumping aggregates. Calculations show that on the Urengoy-Uzhgorod gas line alone it is possible to create energy capacities of 800 megawatts with a return of up to 4 billion kilowatt-hours a year.⁴

In the 1980's there will apparently be a significant increase in the extraction of gas and the supplies of petroleum in Irkutsk Oblast and the Yakut ASSR will begin to be exploited; possibly there will thus be considerable expansion of the scale and geography of petroleum and gas-processing productions. It is quite realistic to count on a 4-6-fold increase in the processing of petroleum and gas in Siberia in the future, bringing the region's share in the unionwide production of plastics and synthetic resins, synthetic rubbers and chemical fibers up to 25-35 percent.

Extensive introduction and use of gas in the southern regions of Siberia (the use of gas in energy engineering, for transportation, in industry and in municipal services) can be a powerful accelerator of intensification of the Siberian economy. It would also be economically expedient in Siberia to use an ever-increasing proportion of productions from petroleum and gas processing, particularly progressive design materials, industrial rubber items, petroleum asphalt, mineral fertilizers and so forth.

The strategy for the extraction and utilization of coals in Siberia envisions the division of the roles between the Kuznetsk and Kansk-Achinsk basins, which will take turns in being leaders of the coal industry. The Kuzbass will be shipping more and more coking coals and high-calorie energy coals to the central regions of the European part of the country; the wastes from enrichment and oxidized coals from the mines will be used in thermal electric power stations. The products from coking and later, possibly, underground gasification of coal will expand the raw material base of the complex of chemical productions in Chemerovo Oblast and Altay Kray.

The target program KATEK envisions the construction of super powerful coal mines and the construction of a group of GRES's with a standard capacity of 6.4 million kilowatts, energy technological processing of coal, the utilization of byproducts from enrichment, ash, and strip-mining rock for producing construction materials and also the startup of experimental industrial installations for obtaining synthetic liquid fuel. They are studying the possibility of extracting aluminum oxide from coal ash for subsequent smelting into metal. In the state plan for the economic and social development of the USSR for 1985 it is intended to put into operation the first section of the Berezov Coal Mine No 1 (planned capacity--55 million tons).

The main direction for the development of the timber complex, with a moderate expansion of logging, consists in concentrating attention on the utilization of timber wastes and transforming Siberia into an extremely large producer of a broad range of products from deep processing of timber. In 1980 from 1,000 cubic meters of felled timber in Western Siberia 25,800 rubles' worth of products were produced, and in Eastern Siberia--22,500 rubles' worth, that is, one-half to five-twelfths the average union level. The procurement of a cubic meter of timber in Siberia is on the average less expensive than in the European regions, but all of the effect is lost because of the long-distance shipments of unprocessed timber. The plans remain unfulfilled for construction in Siberia of the large facilities envisioned as early as the decisions of the 23rd CPSU Congress (pulp plants as part of the Yenisey and Asinov LPK's and others). Losses of raw material on filling areas, during floating of timber, during milling, during storage and also in zones for flooding of the GES are measured in tens of millions of cubic meters.

The structural disproportions in the Siberian timber industry regions are not all the same. In the Lesosibirsk zone, for example, because of the lack of a pulp and timber chemical production and the shortage of capacities for producing fiberboard and chipboard (DVT and DSP) immense amounts of sawdust go to waste. In Ust-Ilimsk, on the contrary, milling is lagging behind, and

therefore good timber is sometimes used for pulp. Not a single LPK in Siberia has been brought up to technological perfection yet.

The variants of the long-term development of the timber complex in Siberia proposed by the Institute of Economics and Experimental and Industrial Production of the Siberian Branch of the USSR Academy of Sciences presuppose increasing the output of products from 1,000 cubic meters of felled timber 1.4-1.5-fold, including plywood--1.5-fold, DVP and DSP--2-fold, and pulp--1.8-fold. The expansion of hydrolysis production (nutritive yeasts) will serve to fulfill the Food Program. In the future the proportion of forest exploitation in the growth output of the branch will decrease from 18 percent (1980) to 11-12 percent, and the proportion of the pulp and paper industry and timber chemistry will increase from 21 to 28-30 percent, and the output of furniture--from 21 to 27-28 percent.

The tendencies toward intensification of the utilization of Siberian fuel and timber raw material are also extending to ores of nonferrous metals and agrochemical and other mineral raw material. Nonferrous metallurgy in Siberia will consolidate its position as a branch of unionwide specialization. Here will be concentrated the main increase in the unionwide production of aluminum, copper, nickel, lead and other nonferrous, valuable and rare metals on the ore base of the existing mining and metallurgical combines (Norilsk and others) and the enlistment of new deposits, mainly in the BAM zone. In Eastern Siberia it is planned to have large-scale production of potassium and phosphate fertilizers which will satisfy the needs of the Eastern regions of the RSFSR. Using the large deposits of mineral salts they will develop electrochemistry, the leader of which will be the Usolye-Viminskiy Chemical Complex.

As calculations of the optimal variants of the development of Siberia as part of the national economy show, during the next 15-20 years it would be expedient to increase the share of the complex in processing fuel and raw material (with electric energy) and producing design materials to 28-30 percent of the gross industrial output, that is, to the highest among the large regions of the country. This complex of branches will take on a leading role in providing for the more rapid development of industry in Siberia, producing up to 40 percent of the increase in industrial output.

Scientific and Technical Progress in the Structure of Siberian Machine Building

The specific natural, economic and social conditions of Siberia place special requirements on scientific and technical progress. Among the priority directions in the region's industry is the creation of conditions for accelerated growth of labor productivity, the application of highly reliable technical equipment to be used in the North, and the creation of superpowerful enterprises for extracting and comprehensively processing natural resources.

Providing Siberian industry with advanced technical equipment is a statewide task. Not only the capacities of the country's machine-building complex, but also the possibilities of international division of labor are being enlisted to carry it out. Optimization of the contribution of Siberian machine

building to the acceleration of scientific and technical progress is one of the most complex problems in the structural policy of the industrial development of Siberia.

Previously concepts of the development of machine building as part of the Siberian economic complex have suffered, it seems, from two shortcomings. First, they have been distinguished by a poorly differentiated approach to the prospects of Siberian machine building; second, they have been oriented primarily toward extensive growth; the construction of new machine-building enterprises.

From the standpoint of factors in the distribution, machine building is an extremely heterogeneous set of productions which are distinguished by an attraction to labor resources, metallurgical and energy bases, the production and social infrastructure, scientific and planning organizations, centers of consumption of products, and so forth. Therefore in the strategy of Siberian machine building it is not even so important to evaluate the overall rate (higher or lower as compared to the unionwide or as compared to the average industrial rates in Siberia) as it is to substantiate the program of structural transformations.

From the branch standpoint the most significant retarding factors in the development of machine-building productions in Siberia are the increased expenditures on wages and construction and installation work. As a sector of the regional economic complex Siberian machine building is experiencing severe pressure from competition of other rapidly developing branches in the distribution of labor resources and construction capacities. These circumstances, however, have essentially different significance, first, for the northern and southern regions and, second, for the development of machine building through new construction or during the course of expansion and reconstruction of existing enterprises. The conditions for the development of machine building in the southern zone (especially in Western Siberia) with its acceptable climate, relative high population density, established infrastructure and skilled personnel approach the conditions of the European regions of the country (the increased costs, say, for wages and construction are no more than 10-20 percent). This is even more correct with respect to the conditions for production in the large machine-building centers. But labor-intensive branches of machine building are also counterindicated in the southern regions of Siberia. Even now in Siberia 36 percent of the industrial production personnel of the region are concentrated in machine building, and it is not realistic to count on increasing this proportion further.

The economic advantages of development in Siberia of many branches of machine building are conditioned, first, by the already formed large industrial centers of a machine-building profile; second, by the proximity of the consumers of the products--unionwide energy and raw material bases, large centers for processing fuel and raw materials (with specific requirements for technical equipment); and, third, the considerable scientific potential which is oriented toward leading directions in the development of technical equipment and technology.

Existing machine-building centers are distinguished, as we know, by a great deal of inertia. Once they are created, the enterprises generate prerequisites for their own further development during the course of technical updating, the introduction of second and third sections, and so forth. This path--intensification of the utilization of available production apparatus and accumulated experience--is usually more advantageous than the construction of enterprises in new regions. The possibilities of developing on their own base are especially favorable in machine-building centers (because of production cooperation and the common infrastructure). In Siberia these include the Omsk, Novosibirsk, Barnaul, Tomsk, Krasnoyarsk, Abakan-Minusinsk, Irkutsk and Ulan-Ude. They include almost all of the subbranches, including the most complicated ones: aircraft and instrument construction, radio technical equipment, and electronics. Regardless of whether or not it was justified to create various kinds of machine-building enterprises here at one time, now the very fact of their existence is a weighty economic and social argument in favor of further development.

Now many machine-building enterprises of Siberia are underutilizing production capacities and frequently they are understaffed with personnel (the coefficient of shift work, as a rule, does not exceed 1.-1.4). We have already given the example of the lack of structural correspondence between Siberian machine building and the regional demands (a considerable proportion of importing and exporting of machine-building products as compared to the production and consumption in the region). The proportion of output of technical equipment is insignificant for the main branches of specialization: petroleum, gas, coal, metallurgical, chemical and petrochemical, timber, wood-processing and pulp and paper industries. Additionally, three-fourths of the technical innovations that are being applied in Siberian industry also come from the European regions. Most frequently they are not adapted in the best way to fight Siberian conditions and, as a result, there are losses of the certified productivity of machines and equipment, a low coefficient of utilization and increased breakdowns.

The All-Union Conference on the Development of the Productive Forces of Siberia which was held in June of 1980 recommended orienting Siberian machine building mainly toward the production, first, of machines and equipment for branches of specialization and also for construction, transportation and agriculture; second, metal-intensive, energy-intensive, relatively nonlabor-intensive and less transportable products which are adapted for use in the eastern zone of the country; third, products for interbranch application (normalized parts and components, welded elements, nonstandard instruments, means of minor mechanization and so forth). Branch optimization calculations confirm the recommendations concerning the development of a number of machine-building productions in Siberia.

The advantage from bringing machine building closer to the centers of consumption cannot be reduced simply to savings on shipping the prepared products, although just by moving to Siberia the production of metal-intensive and less transportable equipment it is possible annually to save several tens of millions of rubles. Apparently of more importance is the possibility of close contact between the producers and consumers of the technical equipment, with the participation of scientific research and experimental design

organizations. The development of the "belt of introduction" on the basis of the Siberian branch of the USSR national economy contributes to this. The program entitled "Siberia" envisions the development in the next few years of scientific production complexes in the leading areas of scientific and technical progress, including machine building.

It is unrealistic to count upon the idea that the growing (quantitatively and qualitatively) demands of the region for machines and equipment will be successfully satisfied (at least in the next decade) through the construction of numerous enterprises. Most frequently they become the exception to the rule. An increase in the contribution of Siberian machine building to the satisfaction of the needs of the region presupposes first and foremost the development and respecialization of existing enterprises and their relief from the output of relatively labor-intensive products that are not significantly involved in the main specialization of the region. Because of the shortage of capital investments in the national economy and the limited capacities of the construction base, in Siberia it is necessary to proceed toward strict selection of highly effective plans which can compete with variants of reconstruction and expansion of enterprises that are located in the more favorable regions or are unprecedented in terms of their technical level and the composition of the products. According to predictions, the proportion of new plants in the gross output of machine building and metal processing in Siberia will not exceed 1-2 percent, and in the future--2 percent (minimum variant)--9 percent (maximum).

Of the proposals that have been advanced, the primary ones seem to be the plans for the creation in Siberia of specialized repair enterprises (in the Western Siberian Petroleum and Gas Complex, Kuzbass, KATEK), plants for nonstandard equipment for branches of heavy industry, and a complex of plants for petroleum and chemical machine building in the south of Western Siberia. In keeping with the Comprehensive Program for Scientific and Technical Progress of the Western Siberian and Eastern Siberian Economic Regions, the actual possibilities of constructing large machine-building enterprises will expand significantly at the turn of the century. We emphasize that one of the key conditions for constructing new machine-building plants--providing them with personnel--should be met mainly through releasing workers from existing enterprises.

Improvement of the structure of machine building in Siberia cannot be limited to the development of productions that directly provide for the branches of specialization and to traditional interbranch productions. Here it is also necessary to have branches which revolutionize machine-building itself: microelectronics, robot construction, the production of flexible automated systems, machine tool-processing centers, and so forth.

It might seem that the selection of this kind of structural policy, which is prestigious for the region, still "spreads out" the specialization of Siberia and limits the advantages of interregional division of labor. These critical considerations are true for the ideal model of instant distribution of scientific and technical progress and instant rearrangement of the regional structures, in the interests of the national economic optimum. But in practice one must also take into account both inertia and local stimuli.

The national economy is now in need of maximum expansion of the production of progressive technical means. To do this it is necessary to take advantage of the possibilities of all regions that have the proper scientific and technical potential. In the opinion of specialists, it is expedient to concentrate progressive productions in large industrial and scientific centers with favorable conditions not only for rapid assimilation of new products, but also for large-scale application of them. Combining in the industrial and scientific centers of Siberia the production and application of progressive technical equipment is an accelerator of the growth of labor productivity primarily in Siberian machine building itself (for example, flexible automated productions increase productivity 2-5-fold and more). Machine building is better able to compete with other priority branches of industry in Siberia from the standpoint of labor resources. It becomes possible to expand the production not only by enlisting labor force from other spheres of activity, but also by achieving an absolute reduction of the number of workers.

Finally, there is also the important social argument in favor of creating in regions of Siberia productions which are on the front lines of scientific and technical progress. The essence of this is the satisfaction of the desires of certain groups of workers (especially youth) for prestigious kinds of activity, which is essential for reinforcing this vitally active part of the population in the regions of Siberia.

Thus the structural changes in the industry of Siberia which provide for its dynamic development and increased contribution to the national economy proceed along two main lines.

The first line is the more rapid development of deep processing of natural raw material and also machine building, which equips the complex of branches of unionwide specialization with highly productive technical equipment that is adapted to local conditions. It is inadmissible to put off following this line, sequentially moving from one technological division to another as when constructing a multistory building. In order to avoid the growing losses from noncomprehensive and inefficient utilization of raw material and from excessively long shipments in the application of ineffective design materials and so forth, it is necessary to break into the upper stories of the economic structure with the development of high-quality metallurgy and petrochemistry and the reorientation of machine building.

The second line is increasing the output of the more advanced technical means. Implementing this will condition the qualitative improvements in the branch structure of the industry of the southern regions which lay the basis for the new stage in the intensification of the economy of all of Siberia.

FOOTNOTES

1. "Sibir' v yedynom narodnokhozyaystvennom komplekse" [Siberia in a Unified National Economic Complex], Novosibirsk, "Nauka", 1980; Granberg, A. G., "Siberia in a National Economic Complex," EKO, No 4, 1980.

2. Tikhonov, N. A., "Sovetskaya ekonomika: Dostizheniya, problemy, perspektivy" [The Soviet Economy: Achievements, Problems and Prospects], Moscow, Izd-Vo APN, 1984, p 46.
3. "Materials of the 26th CPSU Congress," Moscow, Politizdat, 1981, p 185.
4. Zhimerin, D., "There Are Reserves in Electric Energy," PRAVDA, 30 November 1984.

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11772

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TYUMEN OBKOM SECRETARY ALTUNIN INTERVIEWED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 6, Jun 85 pp 27-32

[Interview with Ye. N. Altunin, secretary of the Tyumen CPSU Obkom, January, 1985: "The Country's Main Fuel and Energy Base"]

[Text] [Question] What are the most essential progressive changes that can be expected in the oblast economy in the near future?

[Answer] The party obkom sees Tyumen Oblast's main reserves for increasing its contribution to the country's economy in increasing the scope of development of the petroleum and gas branches, expanding comprehensive utilization of raw material through the development of production for processing it in the oblast, creating large energy facilities and increasing the capacities of construction organizations.

In keeping with the USSR Energy Program, the Tyumen Territorial Production Complex will remain the country's main fuel and energy base. It will retain its leading role in the unionwide extraction of petroleum and gas. Therefore all the major changes in the economy of the oblast are conditioned by the development of these two branches.

New deposits will begin to be developed and the construction of large gas lines will continue. The achievements of scientific and technical progress will be applied more extensively in the industries and the main gas transportation lines. Along with gas, larger volumes of gas condensate will be extracted. The capacity for processing casing head gas will increase.

Further development of the petroleum industry in the oblast will be carried out mainly through developing new petroleum deposits, although the rates of increase in the extraction of petroleum will decrease. The working of new deposits--such as the Samotlorskoye, Fedorovskoye and Mamontovskoye--will become more labor-intensive. A considerable proportion of the wells have already been changed over to the mechanized method of extracting oil and under the next five-year plan this figure will increase. Therefore more significance is attached to organizing repair services and creating bases for them. It will be necessary to improve the quality and reliability of petroleum industry equipment and to increase the period of operation of the

wells between repair jobs. It would be expedient to begin to create a system of service through the efforts of the corresponding plants. A basis has been laid for this.

A further increase in the volumes of extraction of petroleum and gas is impossible without reinforcing the energy base. We now obtain one-third of the energy we consume from the Urals, and in the future it will be necessary to sharply increase the capacities of the oblast's energy system. A great addition will be provided by expanding the Surgutskaya GRES, the Tyumenskaya and Tobolskaya TETs's, and the startup of new GRES's.

It is intended to reduce the disparity between the growth of the main production and the development of the entire production and social infrastructure in the oblast. To do this it is necessary to create reliable transportation support and to increase the volumes of housing and civil construction, which is impossible without essentially increasing the capacities of construction organizations and expanding the base of the construction industry.

Special attention must be given to the development of the agro-industrial complex, which is called upon to provide the oblast's growing population with food products.

[Question] What large industrial facilities are to be created?

[Answer] It will be necessary to include dozens of new petroleum and gas deposits in industrial development and to considerably increase the volumes of work for building up petroleum and gas industries, and constructing gas and petroleum pipelines, large electric power stations and power transmission lines, highways and railroads, residential buildings and facilities for social and domestic purposes. It is necessary to increase the volumes of prospecting and operational drilling and to create large new facilities for producing and repairing industrial, construction and transportation equipment as well as bases for material and technical supply.

Gas workers will begin to work the Yamburg gas deposit and they will begin to assimilate the deposits on the Yamal Peninsula. Petroleum workers plan to "reach" new petroleum deposits. During the 5 years it is intended to construct new main gas lines, the Urengoy-Kholmogory petroleum pipeline, and a railroad to the Yamburg deposit.

In the petroleum and gas fields they will put into operation dozens of installations for preparing petroleum and gas, finishing and field compressor and pumping stations, powerful gas-processing plants and thousands of kilometers of pipelines for various purposes.

Increasing the effectiveness of the Tyumen Fuel and Energy Complex in the new stage is closely related to comprehensive utilization of light hydrocarbon raw material, first and foremost unstable gas benzene and gas condensate. In the Surgut region they have begun the construction of a complex for processing gas condensate. The first section of the Tobolsk Petrochemical Combine will go

into operation. There they will use unstable gaseous benzene to obtain monomers for producing rubber and other petrochemical products.

It seems that questions of effective utilization of gas condensate and unstable gaseous benzene have not been completely resolved. The Institute of Catalysis of the Siberian Branch of the USSR Academy of Sciences has found catalysts which make it possible to increase the octane count of the gasolines obtained from direct distillation of gas condensate. But it has still not been decided how and where to organize their production or to apply the scientist's idea in practice.

[Question] What must be done in order to accelerate scientific and technical progress?

[Answer] The rapid rates of increase in the extraction of petroleum and gas in the oblast have become possible because of a radical change from traditional methods of assimilating deposits, a creative approach to the problems of introducing the latest achievements into practice, and also because of comprehensive utilization of the experience of innovators.

The block-set method of construction which was introduced in Tyumen Oblast has become widespread. Almost all of the facilities for building up the petroleum and gas fields during the construction of petroleum pumping and compressor stations are constructed by this method. The block-set method has been widely used in the construction of cities and villages. We are assimilating the production of superblocs weighing up to 500-1000 tons which makes it possible to considerably reduce labor expenditures at construction sites and to accelerate the construction of complexes, above all the building up of the Yamburg deposit. Further development of the block-set method involves the utilization of better industrial designs and new construction materials as well as the application of power lifting and transportation means.

Better and more powerful domestically produced pumping equipment is being introduced in pipeline transportation. The Sever-1 Assembly and Welding Complex, which was developed by the Institute of Electric Welding imeni Ye. O. Paton, is being introduced successfully. It is intended for electric contact welding of large-diameter pipes under the conditions along the route, and it makes it possible to considerably accelerate welding work and improve its quality.

The same kinds of complexes are to be introduced in the construction of field pipelines and petroleum deposits. The volumes of pipeline construction will increase. Construction subdivisions are now equipped with modern technical equipment and large strides have been made in the organization of their work. We will have to continue to improve the flow-line method of work, which makes it possible to increase the productivity and improve the quality of labor, and to link these indicators directly to the material incentives.

Geologists should create a reliable basis for the growing extraction of petroleum and gas by deepening the study of the promising regions. Equipping geophysical organizations with more powerful computer equipment will contribute to this.

It is also necessary to change the approach to scientific research at petroleum and gas deposits. Research is now conducted, as a rule, during the period of their intensive building up and frequently by institutes of other regions of the country. Therefore the field workers receive the scientific recommendations late, when it is already difficult to adjust the technical program. Not enough fundamental research is being done on the prospects for the development of the region, which would help management workers to construct bridges among economic, technical, social and ecological problems. Branch and applied science are not keeping up with these tasks. In our opinion, an academic center should appear in the petroleum and gas complex.

[Question] On what kinds of socioeconomic problems are you now working?

[Answer] Recently measures have been taken to improve the support for living conditions in the northern cities and villages, buildings and rapidly assembled housing complexes with modern planning are being constructed, and trade and cultural service is being arranged. We are grateful to party, soviet and management agencies of a number of oblasts of the RSFSR, the Ukraine, Belorussia, Uzbekistan, Kazakhstan, Lithuania, Latvia, Estonia, and the cities of Moscow and Leningrad for the large amount of work that has been done to construct residential buildings, facilities for social and domestic purposes and highways in the petroleum and gas regions of Western Siberia.

But in spite of the increased volumes of construction, the provision of the population with housing, kindergartens and schools still remains poor. The continuing increase in the volumes of work in all branches of industry and construction brings about an influx of population. It would seem that a correct combination of watch and watch-expedition methods of work for providing services for the fields and the construction of watch villages and base cities will make it possible to solve the problem of providing housing in the petroleum and gas complex. It is intended to introduce 13.5 million square meters of dwelling space, schools to accommodate 76,000, and children's preschool institutions to accommodate 109,000. This will make it possible to basically satisfy the needs for children's preschool institutions and to resettle residents of cities from temporary housing into well-arranged, modern apartments.

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11772

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WESTERN SIBERIAN PETROLEUM EXTRACTION INCREASES

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 6, Jun 85 pp 33-35

[Article by R. I. Kuzovatskin, deputy minister of the petroleum industry, chief of Glavtyumenneftegaz: "The Petroleum of Western Siberia"]

[Text] The volume of basic production in Glavtyumenneftegaz has increased considerably. Since 1980 the annual extraction of petroleum has increased from 303 to 365 million tons, and 10 new deposits have been introduced for development.

But there has also been a greater effect from natural, geographic and socioeconomic factors which complicates the development of the petroleum industry in Western Siberia. Many of the difficulties are related to the assimilation of new, not yet inhabited regions of the North, and the reduced productivity of deposits that have been discovered in the past decade. The average yield from a well in the existing supply has decreased by 45 percent, and the average yield of a new well has decreased by more than half. Difficulties arise with the creation of new production capacities and the construction of housing, and the shortage of labor force is being felt. This has forced us to double the depth of our drilling and to considerably increase capital investments.

Petroleum workers are extensively taking advantage of the achievements of scientific and technical progress in the assimilation and operation of the deposits. The rapid increase in the volume of drilling work has become possible because of branch drilling, the application of new drilling rigs and a number of progressive technical and technological measures. The application of the gas lift method of working the wells, which reduces labor expenditures, is being expanded. They are conducting experimental testing and applying on an industrial scale methods for increasing the petroleum yield from the beds. Measures are being taken to fight against the encrustations of salts on the wells and the problems of field collection and preparation of commercial petroleum have been solved. Field systems of petroleum gathering and maintenance of the bed pressure, electric supply and communication lines, and roads are being planned comprehensively, as a unified developing system for building up the deposit. The basis of the construction of field objects in Western Siberia has come to be made up of industrial methods (the level of

industrialization is 65 percent), a system of automated planning has been created and is being applied more and more extensively, and electronic computers are used to solve problems of optimal distribution of the branches of the wells and other field objects and communications.

Further development of the petroleum industry of Western Siberia will be determined first and foremost by the raw material base and also by economic and social factors. With further advancement toward the North it will be necessary to deal firsthand with the difficulties related to the eternal frost. The volume of drilling work on the wells that are being operated can increase to 30 million meters a year.

In order to increase the effectiveness of the assimilation of deposits, in the near future it will be necessary to scientifically substantiate and create a technology for the development of beds with supplies of petroleum that are difficult to extract. At new deposits with poor penetrability of the productive layers it will be necessary to apply methods of intensification of the flow of petroleum to the working phases of the well and to use more costly deep purification of the water for systems for maintaining the bed pressure. At old deposits additional capital investments will be necessary and also operational expenditures for the extraction, collection and field preparation of commercial petroleum and for removing water from the petroleum so that it can be returned to the productive bed. In order to reveal less penetrable productive layers it will be necessary to create special solutions instead of the traditional clay solutions.

Further development of industrial methods of construction and a changeover from the blocks that are now being used which weigh 30-40 tons to ones which weigh 200-300 tons with plant manufacture will also increase the effectiveness of the assimilation of deposits. Here there arises the question of creating means of transportation for delivering such large blocks to the place of installation.

A number of additional problems arise with the assimilation of the North and the transpolar region. It is necessary to create special transportation, construction and cargo lifting equipment for operation in these regions, to increase the reliability of petroleum field equipment and to reduce its weight, and also to search for possibilities of reducing labor expenditures on its installation and operation. We need a complex of measures for reducing the number of workers in the North.

Glavtyumenneftegaz will have to construct 8.6 million square meters of residential space and invest about 600 rubles in the construction of cities and villages. We are placing great hopes in assistance from construction organizations of other oblasts and republics in the country. During 1981-1984 they have already constructed about 1 million square meters of residential space for us. The greatest contribution was made by construction workers of the Ukraine, Moscow and Belorussia.

In the polar and transpolar regions ecological problems are especially important. Here one cannot count on methods of assimilating deposits that have been used in the Central Ob area. It is necessary to look for new

engineering decisions and create new technical means (especially transportation) and technological devices. And to do this one must strengthen fundamental research and applied developments and accelerate the search for new engineering decisions and the drawing up of standard plans which involve the erection of individual structures and industrial complexes on frozen ground.

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NORTHERN GAS DEPOSITS DISCUSSED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 6, Jun 85 pp 35-37

[Interview with Yu. I. Topchev, head engineer of the Tyumengazprom VPO, by K. Sidorenko: "At the Northern Gas Deposits"]

[Question] What successes have been achieved by the gas industry of Western Siberia during the 11th Five-Year Plan and what are the achievements in solving production problems during the time that has passed since the preceding conference (June 1980)?

[Answer] Since 1980 the volume of gas extraction has increased 2.1-fold and the assignments of the five-year plan are being overfulfilled. As was planned, we are achieving the main increase in extraction now from the Urengoy deposit which is being built up at accelerated rates. We have begun to assimilate Yamburg, which will produce most of the increase in the extraction. Here we shall use the superblock method of constructing facilities, and for the first time in the practice of drilling for gas in Tyumen we are using incline drilling--this way it has become possible to increase the number of wells in operation in a branch and to apply other progressive technical decisions. In the final analysis the buildup is being accelerated, the assimilated area of the deposit is being reduced, and expenditures on assimilation and the negative influence of the consequences of scientific and technical progress for nature are decreasing.

[Question] How are socioeconomic problems being solved, what are the unsolved problems, and what paths do you see to their solution?

[Answer] Before 1981 the assimilation of Western Siberia did not take place uniformly, the infrastructure lagged behind a great deal, and there were sharp disproportions between housing and industrial construction. And the volume of construction of housing for gas workers under the 11th Five-Year Plan as compared to the preceding one increased almost fourfold, the volume of road construction--fivefold, and more objects for social, cultural and domestic purposes began to be constructed. If we succeed in maintaining these rates, we will be able to catch up and basically satisfy the needs of the field workers for housing.

Many problems are related to the organization of services for the deposits and the development of northern cities. The farther to the north we go, the smaller the population points next to the deposits. In Yamal we shall construct only small watch workers' settlements. And this is quite logical: the farther to the north we go, the more difficult the living conditions are, and the more expensive it is to arrange for man to live. In order to reduce these expenditures we shall reduce the number of service personnel for the northern deposits.

The optimal variant is "production without people." We are striving to approach this. Because of comprehensive automation and increased reliability of the operation of the equipment, we shall we reduce the watch personnel in Urengoy to a minimum, and in Yamburg and Yamal there will be no watch workers at all in the basic production. We hope to solve the majority of socioeconomic problems through technical progress.

[Question] What new is expected in the branch (assimilation of new regions, technical progress and so forth)?

[Answer] An increase in the extraction of gas will be achieved under the condition that we retain today's growth rates of extraction. This is not simple: the conditions for the assimilation of the deposits are becoming more and more difficult. In the future lies Yamal where the northernmost discovered deposits in the country are located. The course toward comprehensive automation in combination with the introduction of new technologies and better equipment will become the main one for building up the deposits and operating them. We shall also include other areas of technical progress at accelerated rates. With the help of researchers and developers of new technical equipment we plan to reduce the metal-intensiveness of the structures to one-half to one-third of the current level. This example shows how important this is. Recently specialists calculated that in order to obtain 1 ton of fuel in Yamal it is necessary to ship in 16 tons of cargo here. We hope that researchers and developers will help us to facilitate the extraction of fuel from the northern deposits.

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RECENT PETROLEUM AND GAS COMPLEX ACHIEVEMENTS RELATED

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[Article by B. P. Orlov, doctor of economic sciences, professor, and V. N. Kharitonova, candidate of economic sciences, Institute of Economics and Organization of Industrial Production of the Siberian Branch of the USSR Academy of Sciences (Novosibirsk): "The Western Siberian Petroleum and Gas Complex Under the 11th Five-Year Plan"]

[Text] The Western Siberian Petroleum and Gas Complex (ZSNGK) by the beginning of the current decade had become the main fuel and energy base in the country. In 1984 approximately 45 percent of all the fuel in the USSR was extracted here.¹ In terms of the rates of increase in industrial output under the 11th Five-Year Plan the ZSNGK outstrips all other fuel and energy complexes in the country (see Table 1). The main sources of growth of production in the ZSNGK are the petroleum and gas branches of industry, whose share in the overall volume of industrial output of the complex exceeds 75 percent.

Table 1--Growth Rates of Production in Fuel and Energy Complexes of USSR (1980 = 100%)*

<u>Complexes</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>
Western Siberian	111	121	130
Southern Yakut	105	119	126
Kansk-Achinsk	103	103	114
Timano-Pechora	105	107	110
Pavlodar-Ekibastuz	107	107	115
USSR, all industry	103	106	111
Including fuel industry	101	103	105

* Compiled from the collection "USSR in Figures in 1983," Moscow, "Statistika", 1984, pp 91-95.

Under the 10th Five-Year Plan the petroleum industry of Western Siberia for the first time began to make up for the decline in the extraction of petroleum in the other regions of the USSR and to provide for all of the unionwide

increase in the production of this kind of hydrocarbon raw material. But the gas industry of Western Siberia has not reached similar positions during this time since the other regions of the country have still produced a certain increase in extraction, albeit an insignificant one. Under the 11th Five-Year Plan Western Siberia began to provide for all of the unionwide increase in the production of hydrocarbon raw material. The average annual increase in the extraction of petroleum (including condensate) in the ZSNGK during 1981-1984 amounted to 17 million tons, of which 14 million tons went to cover the decline in the extraction in other regions of the USSR.² All of the unionwide increase in the extraction of natural gas was also provided by the gas deposits of the ZSNGK. As a result, in 1984 the share of the complex in the unionwide production of hydrocarbons (petroleum and natural gas) increased to 58 percent as compared to 48 percent in 1980.

In recent years, however, we have been lagging behind to a certain degree in the development of the petroleum industry: the control figures for the extraction for the current five-year plan in the annual plans have repeatedly been increased, but the additional assignments have not been fulfilled. Moreover, in 1984 the daily extraction decreased as compared to 1983.³ The effect could be felt from the lack of preparation of the petroleum workers for mass changeover from the tubing head to mechanized extraction at the old deposits and the delay in the assimilation of new deposits, and also the interbranch disproportions (arrears in the construction and development of transportation and electric energy). It will not be easy to compensate for the decline in the extraction of petroleum. The plan for 1985 calls for increasing the extraction of petroleum and gas condensate to 400 million tons. Moreover the gas industry of Western Siberia is including the control figures of the five-year plan for the extraction of natural gas and the additional assignments. At the very end of 1984 an important goal was reached--1 billion units of natural gas extracted each day.

On the whole, according to the plan for 1985, Western Siberia should reach the following positions: 63 percent of the unionwide extraction of gas and gas condensate, 54 percent of the unionwide extraction of natural gas. This is somewhat higher than the control figures of the five-year plan for 1985: 62 and 53 percent, respectively.

In addition to satisfying domestic needs for hydrocarbon raw material, the ZSNGK plays a decisive role in the formation of export supplies of these. Actually, other regions of the country which extract petroleum and natural gas are not in a condition to replace the ZSNGK in its modern functions. This pertains also to foreseeable future. This complex is in the stage of increasing return of hydrocarbon raw material. The possibilities of increasing it are quite significant, especially with respect to natural gas.

The authors of the present article have set for themselves the relatively limited task of revealing the main tendencies in the development of the ZSNGK and the structural changes in its economy that are related to it and which determine the prospects for the development of this complex up to the year 2000. There are many other problems which we are not considering in this article: social, ecological, management and so forth. They deserve special analysis.

Changes in the Branch Structure of Production

Recently there have been essential structural changes in the production of fuel and energy resources: a course has been taken toward increasing the extraction of natural gas more rapidly than that of petroleum.⁴ This long-term strategy in the formation of the country's fuel and energy balance is being implemented consistently in Western Siberia. In the plan for the 11th Five-Year Plan the share of the gas industry in capital investments in the ZSNGK was increased significantly. Because of this during 3 years of the 11th Five-Year Plan the proportion of natural gas in the overall volume of production of hydrocarbons in the ZSNGK (translated into conventional fuel) increased from 25 to 39 percent. For comparison, during the 10th Five-Year Plan the proportion of natural gas increased by only 8 percentage points.

Qualitative changes have taken place in the petroleum industry under the 11th Five-Year Plan. In the first place, as distinct from the 10th Five-Year Plan, all of the increase in the extraction was provided through the start-up of deposits of the Central Ob area, in 1981-1984 they began to develop deposits in two new petroleum regions, the Krasnoleninskiy geographic range in the Near North zone and the Noyabrskiy range in the Far North Zone.⁵ These deposits are essentially different in terms of their natural and geological characteristics, which makes it necessary to find new technical decisions, for example, the development of a technology for drilling oil wells under the conditions of eternal frost. In the foreseeable future advancement to the North is the main direction which provides for increasing the extraction of petroleum in the ZSNGK. This also determines the importance of industrial extraction in the regions of the Far North under the 11th Five-Year Plan.

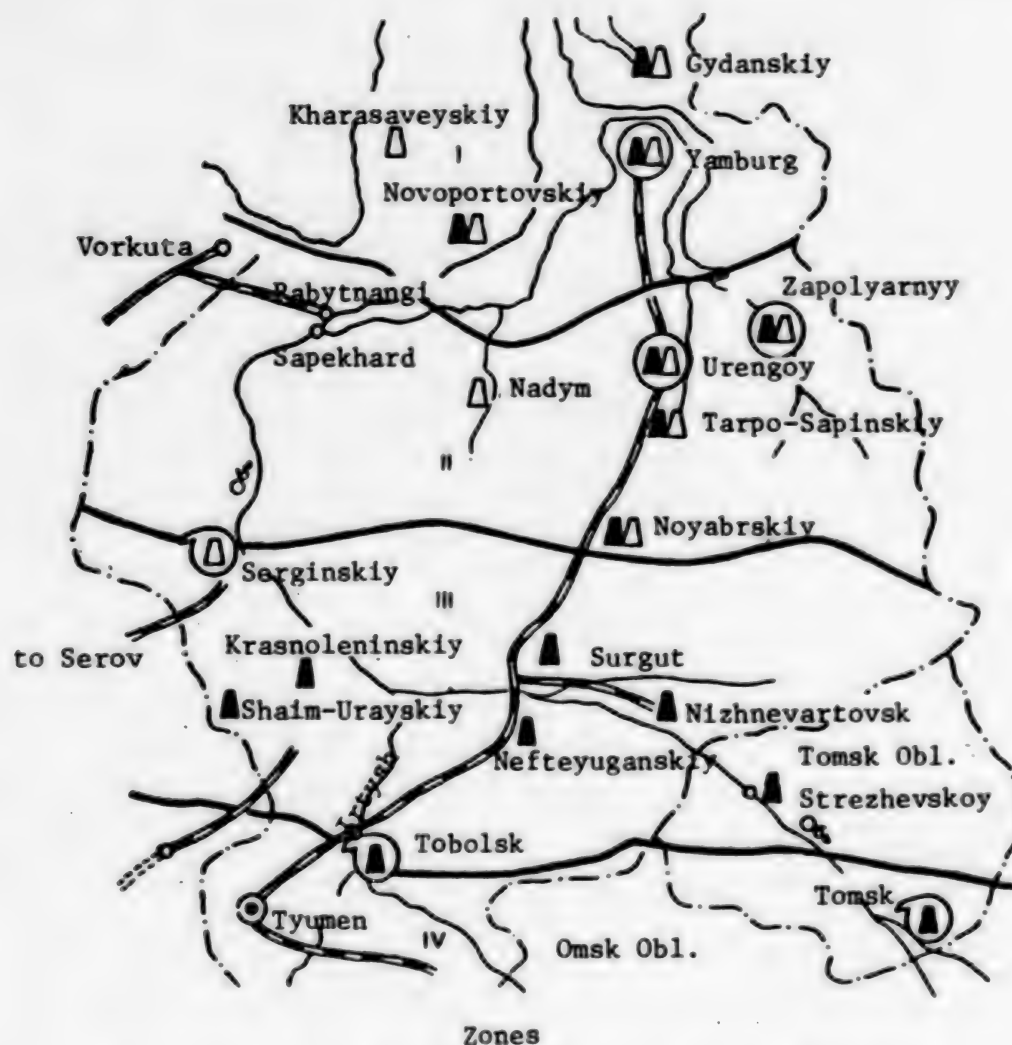
In the second place, there has been an essential increase in the density of the assimilation of deposits of the Central Ob area. Many deposits with average amounts of natural raw material have been put into operation and they have considerably smaller yields from the wells than those received from petroleum deposits that were being worked previously. This has led to a deterioration of the technical and economic indicators for extraction: an increase in the capital-intensiveness and production costs of the products.

In the third place, we have begun a large-scale changeover of deposits that are being worked in the Central Ob TPK to mechanized methods of extraction. In 1983 more than 20 percent of the supply of wells were changed over to methods of forced extraction.

The assimilation of remote petroleum deposits and the increased volumes of deliveries of hydrocarbon raw material to the consumers has led to lengthening the routes of the main pipelines and laying several new transcontinental mainlines.

These changes in the extraction of petroleum and gas have brought about a significant increase in the consumption of material and labor resources in the ZSNGK. Moreover there has been an increase not only in the absolute amount of their consumption, but also in the relative amount, that is, the proportion of resources per ton of extracted product. Thus in 1981-1983 the energy-

intensiveness of the products of the complex increased 1.4-fold, and the capital-intensiveness increased by 11 percent.



I - Arctic II - Far North III - Near North IV - South

Ⓐ Petrochemical	▲ Petroleum	Ⓐ Gas petroleum
Ⓐ Gas chemical	▲ Gas	Ⓐ Petroleum, gas condensate

Diagram of Western Siberian Petroleum and Gas Complex

The initial goal of the formation of the Western Siberian Petroleum and Gas Complex--the creation here of the main unionwide base for the production of hydrocarbon raw material--has been practically achieved. The complex will be functioning in this role for a long time. In the 1970's a new goal was added, the justification for which was conditioned by the economic effectiveness of the processing of hydrocarbon raw material: the creation in Tyumen and Tomsk oblasts of a unionwide base for the chemical industry and the organization of other industries that process local raw materials (condensate, casing head [valanzha] gas).⁶ One should note the logical sequence of these goals of the development of the ZSNGK--a changeover from the extraction of primary raw material to local processing of it. There have been corresponding changes in the branch structure of the ZSNGK investment program. Under the 11th Five-Year Plan a real basis was laid for the development of the chemical industry and the ZSNGK as a branch of specialization under the 12th and 13th five-year plans. At the end of 1984 they put into operation the first start-up complex of the Tobolsk Petrochemical Combine--a gasification installation for producing monomers (the initial products for manufacturing synthetic rubber, polymers and a wide range of petrochemical products). Thus they solved to a considerable degree the problem of effective utilization of nonstable benzene,⁷ which is obtained at gas-processing plants of the ZSNGK. Production capacities were put into operation for hydraulic cracking in the Omskorgsintez Association, which makes it possible to cut in half the proportion of petroleum for producing light petroleum products.⁸ At the beginning of the five-year plan they put into operation capacities for producing polypropylene, and then methanol at the Tomsk Petrochemical Plant.

The investment program also included expenditures on the creation in the ZSNGK of additional capacities for energy engineering (including an energy network for interregional and intraregional purposes), in the industry for construction parts and elements (particularly in the Surgut and Urengoy industrial centers), in general-purpose transportation and in construction. The share of these branches in the structure of the production capital investments and the ZSNGK almost doubled (from 6 to 11 percent). The creation of facilities in these areas was necessary primarily to ensure reliable functioning of the ZSNGK.

New Condition of Construction

Under the 10th Five-Year Plan the deliveries of products for the investment branches and the development of the construction base lagged significantly behind the rates of development of the drilling of the deposits.⁹ This brought about a relatively low provision of capital for the production and social infrastructure. In 1981-1984 there was an acceleration of the growth rates of construction capacities and the introduction of industrial methods of construction. The organization of patronage assistance on the part of construction organizations of Leningrad, the Urals, the Ukraine, the Baltic area and Kazakhstan in housing and road construction exerted a positive influence. The organizations that were enlisted provided for about 30 percent of the highways that are being constructed and 17 percent of the housing. As a result, the assimilation of capital investments in the aforementioned areas increased from 60 percent under the 10th Five-Year Plan to 90-96 percent under the 11th. One should also note the relatively high quality of the housing and

highways that are constructed by many patronage organizations. Patronage assistance should be extended to the construction of other facilities of the social and domestic infrastructure: public health, preschool education, municipal services and amenities, and so forth.

In pipeline construction the strengthening of the material and technical base, the changeover to comprehensive technological flow lines and the organization of the all-encompassing brigade contract in the technological flow line made it possible to accelerate the rates of the creation of main gas lines. While under the 10th Five-Year Plan one branch of the gas line required an average of 2 years, during the 4 years of the 11th Five-Year Plan five gas lines have been constructed (including the export line of Urengoy-Uzhgorod); in 1984 they began to construct the Yamburg-Yelets gas line.¹⁰

In the gas industry, because of the improvement of equipment (reduction of its sizes and weight with an increase in unit capacity) and efficient combining of it, the time period for the construction and startup of installations for comprehensive preparation of gas (UKPG) has decreased to approximately two-thirds the previous amount.¹¹

The watch-expedition method of conducting work in the ZSNGK plays an important role in reducing the peak loads on the investment program. According to the data of A. D. Khaytun (NIPiorgneftegazstroy of the USSR Ministry of Construction for the Petroleum and Gas Industry), in 1981-1983 45 percent of the volume of work in pipeline construction was carried out with this method.¹² While under the 10th Five-Year Plan only 20 percent of the operational drilling was done by "floating brigades" from Tatariya, Vashkiya and Belorussia, in 1984 they drilled approximately one-third of them.

But the measures that have been noted did not completely eliminate the arrears of the construction complex. Construction capacities used for building up petroleum and gas fields are still inadequate, especially those which specialize in constructing facilities of the infrastructure: electric power transmission lines and substations, field and interfield roads, material and technical supply bases, and objects for the social and domestic infrastructure. If one were to rank the subbranches of construction according to the fulfillment of the planned volumes of construction and installation work, the main subbranches that retard the construction are the energy network, transportation and nonproduction subbranches. In 1981-1984 the electric network was put into operation in an amount of 60 percent of the plan, highways--90 percent, and housing--86-96 percent.

The inadequate mobility of the collectives and the low technical level of the production bases are the main reasons for the slow development of construction capacities in the new regions. As a result there is a significant differentiation of the shortage of capacities throughout the territory. While in the Sredne-Ob TPK the construction capacities provided for the assimilation of the planned capital investments by 85-90 percent, in the Urengoy Industrial Center, the main center of gas extraction in the country, it was only 70 percent.¹³

In oil field buildup the greatest "bottleneck" is work for changing the existing deposits over to mechanized extraction. The plans for the introduction of production capacities, particularly gas life compressor stations, are being fulfilled by approximately 50 percent. On the whole, the analysis that was conducted of the fulfillment of plans for the startup of production capacities of the ZSNGK makes it possible to draw the conclusion that under the 11th Five-Year Plan there was a greater shortage of capacities for installing equipment: the plans so far have been fulfilled by an average of 60 percent.

At the same time it is necessary to seriously improve the quality of the equipment that is delivered. A crucial task of the 12th Five-Year Plan is to accelerate the development of petroleum, gas and chemical machine building for the needs of the ZSNGK. It is becoming obvious that there is a need to develop and consistently implement a technical policy which is oriented toward the creation of equipment which satisfied geological and natural-climatic conditions of the ZSNGK. It seems that it would be useful to work on the question of the orientation of machine building in the south of Western Siberia, particularly Tyumen, Tomsk and Kemerovo oblasts and also the Central Urals for the needs of the ZSNGK.

An analysis of the ratios between the growth rates of energy-intensive productions in the ZSNGK under the 11th Five-Year Plan and the planned rates of energy construction showed that under the 12th Five-Year Plan it will be especially crucial to accelerate the implementation of the program for energy construction in the Sredne-Ob and Severo-Tyumen TPK's. In the future period the main load on the energy system of the ZSNGK will be formed in these TPK's. The reliability of the energy supply for the Urengoy gas condensate deposit and in the future the Yamburg as well will increase considerably with the startup of the Urengoykaya GRES.

Under the 11th Five-Year Plan construction is being completed on the Surgut-Urengoy railroad, and a large part of its sections will be put into permanent operation. Thus in 1985 it was intended to put the Kholmogory-Urengoy section into operation.¹⁴ But, according to our calculations, it will be necessary double the capacities of transportation construction in order to create sidings and station facilities which make it possible to increase the handling capacities of the railroads of the ZSNGK in proportion to the growth of the volumes of capital construction in the future.

Changes in the Spatial (Territorial) Structure of the Economy

Two stages can be traced in the development of the economy of the ZSNGK.¹⁵ In the first (1966-1975) on the territory of the Western Siberian Petroleum and Gas Province there appeared several industrial units (PU) which differed in terms of the structure of the economy and the amount of population. In the Central Ob area these were the Surgut, Nizhnevartovsk and Nefteyugansk PU's, which are located in Tyumen Oblast, and the Strezhev in Tomsk Oblast; and in the Ural area--the Urayask PU, where the first oil fields have been created. These industrial centers appeared in the zone of the Near North. In the Far North they have begun to form the Nadym PU.

The economy of the Southern Zone has played the role of a support base for the assimilation of the petroleum and gas regions; the main scientific research and planning-design organizations as well as plans for the repair of equipment and the creation of block-set structures for the development of the petroleum deposits were located here. Tyumen and Tobolsk were especially significant in providing for the shipment of cargo to the petroleum and gas regions. When there was no year-round general-purpose transportation, 80-95 percent of the cargo was shipped on the rivers. In this situation the main capacities of accumulation bases were created in Tyumen and Tobolsk, and here is where they carried out the transshipment of cargoes from rail transportation to river transportation. An analogous role, although on a much smaller scale, was played by Tomsk for the petroleum deposits of Tomsk Oblast. In this stage Tobolsk had not yet been formed as an industrial center (its role in the transportation of cargo was purely intermediate). The Southern Zone was the food base for the petroleum and gas regions.

An important peculiarity of the spatial structure of the economy of the ZSNGK in the first stage was the relatively autonomous development of the industrial centers that arose. Their economic ties for the consumption of resources were oriented either toward the southern zone of the complex or toward the European regions of the USSR (including the Urals) or--partially--toward the adjacent areas of Western Siberia. The ties among the industrial centers of the petroleum regions in this stage were basically intermediary in nature: they were joined together by a common goal--the creation of the country's main petroleum base. The direct ties (the exchange of population, territorial distribution of technical equipment and production collectives) were relatively weak. There were practically no economic ties between industrial centers of the petroleum regions (the Near North) and the gas regions (Far North).

The most general patterns in the second stage of the formation of the spatial structure of the ZSNGK (1976-1985) are the shifts of the investment activity and the extraction industry to the new regions, mainly to the Far North, and also the strengthening of intraregional economic ties.

One can judge the first of these patterns from the figures in Tables 2 and 3.

Table 2--Territorial Structure of Capital Investments in ZSNGK, %

<u>Zones</u>	<u>Five-Year Plans</u>	
	<u>10th</u>	<u>11th</u>
Total	100	100
1. Far North	37	45
Including Severo-Tyumen TPK	15	20
2. Near North	60	52
Including Sredne-Ob TPK	50	38
Krasnoleninskiy Rayon	--	3
3. Southern Zone	3	3

Table 3--Territorial Structure of Production in ZSNGK, %

Zones	Extraction					
	Total		Including:			
	Hydrocarbons		Natural Gas		Petroleum and Gas Condensate	
	1980	1983	1980	1983	1980	1983
Total	100	100	100	100	100	100
1. Far North	25	39	100	100	--	2.4
Including:						
Severo-Tyumen TPK	23	38	95	97	--	--
Berezovo, Noyabrsk	2	1	5	3	--	2.4
2. Near North	75	61			100	97.6
Including:						
Sredne-Ob TPK	69	56	--	--	92	89.8
Krasnoleninskiy Rayon	--	0.1	--	--	--	0.2
Strezhevskiy PU	6	4.9	--	--	8	7.6

New petroleum extraction regions began to be formed under the 11th Five-Year Plan: the Krasnoleninskiy (Nyagan) in the Near North and Noyabrskiy (Noyabrsk) in the Far North. Under the 12th Five-Year Plan the proportion of new regions in the capital investments and production will increase significantly.

Under the 10th Five-Year Plan one could see a tendency of merging of industrial centers which were previously relatively isolated from one another into a unified territorial combination of a higher rank--the territorial production complex. This is the result of the strengthening of previous economic ties among individual PU's and the appearance of new ones--for the production and consumption of casing head gas, electric energy, construction elements, repair services, migration of the population and labor resources, training and utilization of specialists, and so forth. A decisive role here was played by the creation of large facilities for intraregional purposes (GRES, DSK and so forth) and a unified transportation network. The Sredne-Ob TPK was the first to be formed on the territory of the ZSNGK.

By now the spatial structure of the economy of the ZSNGK is represented by the following territorial production combinations: the Sredne-Ob TPK, the Strezhevsk and Uraysk industrial centers in the zone of the Near North, the Severo-Tyumen TPI (on the basis of the Nadym and Urengoy PU's) in the Far North, and the Tobolsk and Tyumen industrial units in the Southern Zone. Under the 11th Five-Year Plan the Sredne-Ob TPK is the leading petroleum base of the complex. It includes the Surgut, Nizhnevartovsk and Nefteyugansk industrial units. The Severo-Tyumen TPK fills the role of the main gas extraction base (see Table 2). These TPK's are the "nuclei" of the investment program of the ZSNGK.

The branches of specialization of the Sredne-Ob TPK are petroleum extraction and primary gas processing. In 1984 the level of extraction of petroleum (along with condensate) reached 340 million tons, which comprised 50 percent of the unionwide production. In the Sredne-Ob TPK are concentrated 45 percent

of the capacities for processing petroleum (casing head) gas in the USSR. This makes it possible to utilize in the economy about 70 percent of the petroleum gas resources extracted from the deposits of the Central Ob area. The dry gas obtained at the gas-processing plants is utilized as fuel at the Surgutskaya GRES and a large part of it is sent along the main pipeline of Nizhnevartovsk-Parabel-Kuzbass for the needs of the metallurgy and chemical industry. Another product, unstable benzene, is petrochemical raw material for producing products of organic synthesis. The Tobolsk Petrochemical Combine (NKhK) will be a consumer for which it will be economically effective to utilize the unstable benzene from the Sredne-Ob TPK. as a result of the prolongation of the time periods for its creation, this product of the Sredne-Ob TPK is being used at existing plants of the Ural and Volga areas.

The service branches of the TPK: electric energy, the construction materials industry, paper procurements, repair work, and material and technical supply. The intraregional transportation network includes the railroad, waterways, pipelines and air routes. The river routes of the Central Ob area handle about 30 percent of the cargo of the ZSNGK. The Surgutskaya GRES is the complex's energy base.

Within the Sredne-Ob TPK under the 11th Five-Year Plan essential changes were noted in the system of distribution of the population. While under the 10th Five-Year Plan 85 percent of the population were concentrated in the three base cities, by 1983 the share of these cities had dropped to 70 percent. Under the 11th Five-Year Plan there is a rapid growth of workers' settlements which are located near the newly developed petroleum and gas deposits. These deposits are located, as a rule, within a radius of 70-150 kilometers from the base cities. Thus the populated area of the Sredne-Ob TPK is increasing.

The regional economy of the Severo-Tyumen TPK is in the pioneering stage of its development; the rates and volumes of construction of industrial centers and, consequently, the level of development of the gas industry are determined mainly by the volumes and time periods for the delivery of industrial products from other regions of the country. When the new Surgut-Irengoy railroad is put into permanent operation new direct ties will appear between the Severo-Tyumen TPK and the bases for batching cargoes which are located in the Tobolsk Industrial Center. Because of the construction of the Urengoy'skaya GRES and the Novo-Urengoy and Nadym housing construction combines, the Severo-Tyumen TPK will have more regional functions associated with providing service for economic assimilation of the Yamburg and transpolar gas condensate deposits and also the deposits of Tazovskiy Rayon.

The Tyumen and Tobolsk industrial centers were developing relatively independently at first. During the 10th Five-Year Plan the interconnections between them became considerably stronger, which gives reason to assume the possibility of creating in the future on the basis of these the Tyumen-Tobolsk TPK. With the introduction of the capacities of the Tobolsk Petrochemical Combine there will be a basis for cooperation between the Tyumen and Tobolsk PU's, particularly because of the possibility of utilizing petrochemical products of the latter in enterprises of the chemical industry, for the construction of the parts and elements, and in furniture production of the Tyumen PU.

An important peculiarity of the development of the TPK system under the 11th Five-Year Plan is the strengthening of economic ties under the aforementioned territorial production complexes. Here a major role is being played by the Seredne-Ob TPK. This is the most developed regional complex on the territory of the petroleum province, which is characterized by a relatively high concentration of construction capacities and the existence of a relatively developed social and domestic infrastructure. Possibilities have been created for transforming the Seredne-Ob TPK into a support base for the assimilation of the petroleum and gas regions of the Far North. Under the 11th Five-Year Plan this TPK began to send electric energy to the North. Its construction organizations are becoming the base ones for construction work in Turovskiy Rayon (Noyabrsk, Tarko-Sale). Surgut construction workers are constructing electric power transmission lines on the territory of all of Tyumen Oblast. They have begun deliveries of construction elements to Novyy Urengoy and Noyabrsk. With the assimilation of the planned capacities of the Tobolsk National Economic Complex effective ties will be established between the Seredne-Ob and Tyumen-Tobolsk TPK's for the utilization of unstable benzene which is produced at the Seredne-Ob TPK as petrochemical raw material. It is also possible to have a reverse flow of petrochemical products to the construction industry of the Seredne-Ob TPK.

In the future when condensate is used as a raw material based of the Tobolsk National Economic Complex, in the Seredne-Ob TPK it would be expedient to install capacities for primary condensate processing. Then the condensate can come from the Severo-Tyumen TPK. The Seredne-Ob TPK has a fuel base for the creation of additional capacities for electric power engineering and bases for the development of large railroad centers and in the industrial base for construction.

These factors combined with its central position in the ZSNGK are favorable for locating in the Seredne-Ob TPK new processing productions whose products can be sent for the satisfaction of the needs of the Western Siberian Petroleum and Gas Complex: processing of condensate for fuel, oil refining with a high yield of a broad range of light petroleum products (benzene, oils) and the timber industry complex.

The location of these productions in the Seredne-Ob TPK would make it possible to reduce the load both on the southern part of the regional transportation network and on the interregional transportation network. The fact is that the raw material base of the branches proposed for location here is either in the Seredne-Ob TPK itself or the Severo-Tyumen TPK, but the products of these two branches are intended mainly for the petroleum and gas regions.

At the same time the permissible limits of concentration of the capacities for electric engineering, processing industries and repair bases can apparently be determined by the ecological conditions, the shortage of territorial space, the labor-intensiveness of construction and repair, and the possibility of providing the population with services of the social and domestic infrastructure within the earmarked time periods.

The Tyumen-Tobolsk TPK, in addition to performing the functions of the base-accumulator for the cargo that is shipped into the northern regions, is also a scientific research and planning base for the ZSNGK. Machine building of the Tyumen PU is being reoriented, although slowly, toward the satisfaction of the needs of the northern petroleum and gas regions. In particular, in the Tyumen PU at bases of Sibkomplektmontazh they have begun construction of installations for comprehensive processing of gas which are built out of blocks on air cushions for the Severo-Tyumen TPK.

Thus under the 11th Five-Year Plan there have been tendencies toward an essential rearrangement of the spatial structure of the economy of the complex. Moreover, the main tendencies are long-term in nature. Their effect can be significant throughout the entire forthcoming stage of comprehensive assimilation of petroleum and gas resources of Western Siberia. In this connection it is important in the stage of preplanning research to develop schemes for optimization of the distribution of productive forces in the forthcoming period. Here it is necessary to determine the efficient structure for the economy of each territorial production combination and economically justified ties among them.

FOOTNOTES

1. Calculated according to the data: Maksimov, Yu. I., "Extraction of Fuel and Energy Resources in Siberia," IZVESTIYA SO AN SSSR. SERIYA OBSHCHEST. NAUK, 1982, Issue 2, No 6, p 37; materials from current statistics.
2. Aganbegyan, A. G., "The Western Siberian Petroleum and Gas Complex in the Economic Development of the USSR," IZVESTIYA SO AN SSSR. SERIYA EKONOMIKI I PRIKLADNOY SOTSIOLOGII, 1984, issue 2, No 7, p 6; authors' calculations.
3. PRAVDA, 21 November 1984.
4. In keeping with the state plan for 1985 in the USSR for the first time the extraction of natural gas (translated into petroleum should exceed the extraction of petroleum.
5. Economically and geographically the territory of the Western Siberian Petroleum and Gas Complex can be divided into four zones: the Southern (up to 58 degrees northern latitude); the Near North (from 58 to 63 degrees); the Far North (extending to the Arctic Circle) and the Arctic zone. These zones are distinguished from one another by their natural and climatic conditions, the composition and supplies of natural materials, the degree of population and economic assimilation, and so forth.
6. Calculations have shown that it is much more effective to locate energy-intensive and electricity-intensive productions near inexpensive fuel, that is, mainly in Siberia than in the European part of the USSR.
7. The scale of production of this valuable petrochemical raw material is now being determined by the possibilities of transportation and processing

at plants of the Volga area, which amount to one-third of the raw material capabilities of the ZSNGK.

8. Fedorov, V. S., "Deepening Processing Hydrocarbons," EKONOMICHESKAYA GAZETA, No 27, 1984.
9. Ageyeva, S. D., Orlov, B. P., "Several Features of the Investment Process in the Western Siberian Petroleum and Gas Complex," IZVESTIYA SO AN SSSR. SERIYA OBSHCHEST. NAUK, 1982, issue 3, No 11, p 86.
10. Voznyak, V., "On the Routes of the Gas Lines," EKONOMICHESKAYA GAZETA, No 41, 1984, p 4.
11. "The Price of 'Blue Gold'," EKO, No 5, 1983, p 66.
12. Khaytun, A. D., "Ekspeditsionno-vakhtovoye stroitelstvo Zapadnoy sibir'i" [Expedition-Watch Construction in Western Siberia], Leningrad, Stroyizdat, 1982, p 22.
13. See Skorobogatova, V. I., "Analysis of the Development of the Urengoy Industrial Center," IZVESTIYA SO AN SSSR. SERIYA OBSHCHEST. NAUK, 1983, issue 3, No 11, pp 49-50.
14. Demenev, A. D., "The Startup Program for 1985," EKONOMICHESKAYA GAZETA, No 1, 1985.
15. Substantiation of the duration of the stages and their qualitative description are given in detail in the article: Orlov, B.P., Kharitonova, V. N., "The Formation of the Spatial Structure of the Western Siberian Petroleum and Gas Complex," IZVESTIYA SO AN SSSR. SERIYA OBSHCHEST. NAUK, 1983, issue 3, No 11, pp 30-39.

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SCIENTISTS PREDICT SIBERIAN DEVELOPMENT

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 6, Jun 85 pp 51-65

[Article by A. A. Trofimuk, A. S. Alekseyev, A. V. Rzhanov, S. S. Kutateladze, Ye. I. Shemyakin and K. I. Zamarayev: "Predictions of Scientists"]

[Text] In connection with the all-union conference on the subject "The Development of Productive Forces of Siberia" which will take place in June 1985, the editorial staff has asked scientists of the Siberian Branch of the USSR Academy of Sciences three questions.

1. What new results can be expected from the science with which your activity is connected?
2. Which of its achievements will industry have assimilated by the year 2020?
3. What influence will this exert on the development of the productive forces of Siberia?

Director of the Institute of Geology and Geophysics of the Siberian Branch of the USSR Academy of Sciences, Academician A. A. Trofimuk:

1. The development of geochemistry of hydrocarbons and the discovery of the conditions for the formation of deposits of petroleum and gas will create prerequisites for more precise substantiation of the prognosticatory evaluations of the resources of hydrocarbon raw material both on the territory and in the water areas of the USSR.
2. The development of geochemical and geophysical methods of direct searching for hydrocarbons will essentially reduce expenditures on discovering the deposits of hydrocarbons through the drilling of wells.
3. The application of the latest achievements of science in order to search for, prospect and develop deposits of hydrocarbons will create a firm basis for complete satisfaction of the needs of the USSR for hydrocarbon raw material. Comprehensive and effective utilization of hydrocarbons is the main factor in accelerated development of productive forces not only in Siberia, but in the entire economy of the USSR.

Director of the Computer Center of the Siberian Branch of the USSR Academy of Sciences, Academician A. S. Alekseyev:

1. Our main efforts in the development of the theory of computer methods of geophysics will be directed toward modeling and creating new methods of obtaining and processing geophysical information in order to study the internal structure of the earth and geodynamic processes and to search for minerals.

The basic and fundamental result which should be achieved by the year 2000 is solving the reverse dynamic problems of the seismic method of investigation and the creation of methods for measuring dynamic characteristics of wave fields. This will make it possible to radically modernize the technology for working with seismic prospecting and in seismology by changing over from utilizing the times of the ways to utilizing the complete wave field of the vibrations on the earth's surface. One can expect greater and greater precision, reliability and information content from the methods of geological prospecting and global physics.

2. Three achievements will be essential for improving geological prospecting work:

increasing the effectiveness of methods of geophysical prospecting for minerals under the conditions of the complicated geological structure (traprocks of Eastern Siberia, the paleozoic complex of the southern boundary of Tyumen, and so forth), the assimilation of new stages of already assimilated regions and nonstructure deposits in all previously assimilated regions (the Bazhenov strata, the reef "structures," and so forth);

the utilization for planning of geological prospecting work of the more precise laws of distribution of minerals which are obtained through increasing the activity and precision of regional geophysical research and the utilization of methods of direct search for deposits and detailed geodynamic representations;

new, control technology for gathering, transmitting, processing and operationally utilizing geophysical information as a result of changing over from the methodology of geophysical charting according to a priori planned profiles to methods of controlled search according to comprehensive geological and geophysical criteria on the basis of field express processing, and side channels of interactive transmission and precision processing of information in regional supercenters.

3. This will exert a number of positive influences on the development of the productive forces of Siberia. The most important are the following:

higher technical and economic indicators for geological prospecting branches, which in the year 2020 will be faced with even more complicated and difficult tasks;

the possibility of technically and economically substantiated selection of the sequence of stages and regions for the assimilation of Siberia and the Far East;

the creation and utilization of new information technology for accumulating, processing and utilizing geological-geophysical and technical-economic knowledge throughout the entire sphere of comprehensive assimilation of the natural resources of Siberia and the Far East.

Director of the Institute of Physics of Semiconductors of the Siberian Branch of the USSR Academy of Sciences, Academician A. V. Rzhanov:

1. In the area of semiconductor physics and solid state electronics in the foreseeable future one can expect two groups of new, principally important results. The first is related to the utilization of electronic, optic and vibrational processes and combinations of these in atomic structures that are ever decreasing in size. Moreover we are speaking not simply about their miniaturization, but about the utilization of principally new quantum phenomena which are typical of such structures. This will lead to further improvement and reduced cost of the element base of computer equipment, information systems and automation.

The second group of results is related to the appearance and development of devices that are capable of directly perceiving information and are thus analogues to vision, touch, hearing and smelling. Individual elements of the sensor have been known for a long time, but now we are speaking about perceptive systems which are organically linked with devices that process the information that is perceived. In the near future such systems will hardly be able to compete with human sense organs in terms of their sensitivity and selectivity in processing information. But they will essentially surpass human capabilities in terms of the breadth of their spectral range of perceived information. Thus, for example, artificial vision will be extended into the infrared, ultraviolet and X-ray areas of the spectrum.

It should be especially emphasized that obtaining both groups of results will be determined not so much by the appearance of new ideas, the supply of which is fairly significant as at the present time, as by the development and improvement of technology for realizing them. And the development of the technology itself will increasingly require interactions with in-depth fundamental research.

2. The assimilation of the aforementioned scientific results will lead first and foremost to a sharp increase in the volumes of production and a reduction of the cost of the items of microelectronics and solid state electronics. One of the most important results of this will be extensive dissemination of personal computers and expansion of their functions. In addition to the duties of a personal secretary, such computers can be used for special reference works, personal archives, and technical assistance which will take on most of the routine mental work. All this will essentially change the very nature and intensiveness of any creative activity.

On the other hand, the creation of automated systems that are capable of directly perceiving and processing external information will lead to radical changes in the area of robot equipment, automation of production and the creation of systems for gathering information. In particular, during the next decades there should appear automated specialized and universal robots which have long played a role in scientific-fantastic literature.

3. Although the most important achievements of semiconductor physics and solid state electronics will be fairly general in nature, one can note their role in solving certain specific problems of Siberia. One of them will be the creation of an aerospace system for on-the-spot reporting of places where forest fires start in the Taiga. With the utilization of systems for spotting which work in the infrared area of the spectrum, cloudiness, fog or the smoke screen from the fire itself will not interfere. Such systems operating in other areas of the spectrum can be used to discover outbreaks of propagation of tests, to determine the quantity of moisture in the soil and to predict the productivity, they can be used for discovering and determining amounts of minerals, and so forth.

There is no need to especially emphasize that automation of production and the application of various kinds of robots are especially important under the severe conditions of Siberia and the Far North.

Director of the Institute of Thermal Physics of the Siberian Branch of the USSR Academy of Sciences, Academician S. S. Kutateladze:

I have not divided up my ideas among the three questions that were asked: here everything is interconnected--both on the scientific and technical plane and in the unity of the development of the national economy of Siberia and the country as a whole.

Thermal physics is the science of macrotransfers of energy and substance which are accompanied by thermal effects. It is based on two fundamental laws of nature--the preservation of the energy-mass and the increase in entropy in closed systems. This is precisely why the areas of its interests in natural science and applications in technologies are practically unlimited. This science also lies at the basis of the main technology of machine civilization--energy engineering. Its significance was evaluated with the creation of the Siberian branch of the USSR Academy of Sciences--here they created the first specialized Institute of Thermal Physics in the World. A large collective of scientists is now working at it, whose activity has been given broad international recognition.

At the end of the 20th century and the beginning of the 21st it is of decisive significance for the USSR national economy to develop in Siberia energy engineering using organic fuel--mainly with comparatively low-calorie, but inexpensive rock coals of the Kuzbass and Kansk-Achinsk basins. There has been significant construction of electric power stations using gas in the gas and petroleum regions of the northwestern part of Siberia and Yakutiya, and also the creation of specialized, relatively small electric power stations using nuclear fuel for the northern regions of the country and thermofication nuclear stations in certain large industrial centers of Siberia.

A basic engineering object which requires effective new decisions is the steam boiler. The dimensions of the modern standard steam boiler for a block of 800 megawatts installed at the Berezovskaya GRES are these: height--more than 110 meters, cross-section--24 meters by 24 meters, and weight of metal of heating surfaces--more than 18,000 tons. The changeover to more efficient designs with various means of vortical burning of coal will make it possible to essentially reduce the sizes, metal-intensiveness and cost of thermal stations in Siberia and will increase their reliability. Regardless of this it is necessary to solve the problem of organizing enriched rock mass which is extracted in the coal mines of Siberia and Central Asia, that is, to separate out from the fuel the inert impurities which now reach 40 percent and more. This will not only increase the effectiveness of the transportation of the solid fuel, but will also sharply improve the operational reliability of the coal-fueled electric power stations and will make it possible to practically refrain from mass application of liquid fuel in them for the so-called "lighting." It is possible to provide stable burning of low-calorie fuel with relatively small expenditures of electric energy with electric arc plasma generators that are built into the furnace chambers.

Questions of saving energy and ecology are of decisive significance for the development of energy engineering and energy-intensive productions in Siberia. They are closely related to one another.

It is necessary to arrange mass production of coal briquettes for household and industrial purposes. Here a great deal can be done by energy and chemical combines at the GRES's. In addition to this it is necessary to sharply reduce small boilers which now employ several millions of people in unproductive labor. For medium and small energy engineering it is necessary to use boilers with furnaces that have a boiling layer, which will solve many ecological problems at the same time.

Within the framework of the statewide program for saving energy in chemical branches of industry we shall solve problems of sharply reducing the consumption of fuel for technological needs and create closed or quasiclosed technological processes, which will make it possible to eliminate chemical and thermal pollution of the water basins.

One must include among the principal scientific and technical problems the search for effective ways of processing Siberian low-calorie coals into liquid fuel particularly on the basis of the message of the Institute of Combustible Minerals and several others that are being developed at the present time. Probably by the end of this century these questions will not only be resolved in principle, but will also become an economic reality.

More abstract but very promising is the problem of the assimilation of the phenomenon of superconductivity in electric equipment. The creation of powerful superconductor accumulators of electrons and superconductor machine sources of large currents and the assimilation of technical equipment for superconductivity for ship engines (especially atomic icebreakers) promise revolutionary changes in a number of branches of the national economy.

Director of the Institute of Mining of the Siberian Branch of the USSR Academy of Sciences, Academician Ye. I. Shemyakin:

1. In the area of mining sciences two directions are being developed, which were earmarked and were first substantiated during the 1960's-1970's:

deepening knowledge of nature and the laws of manifestation of underground pressure when tunneling in mines and pits;

the development of instrument observations in order to provide safety and efficient technologies for extracting minerals; extensive development of surveying services, including underground pressure services;

further development of methods for automating the planning of mining enterprises as well as automating the control of construction in mining and of plans for mining work.

As has been shown by research of recent years and the practice of applying the results that have been achieved in the mining industry, it is impossible to control large-scale work without extensive use of electronic computers and means of automation. The application of these new methods leads to increased labor productivity in the branches as a whole and to increased volumes of extraction.

In the area of the creation of new technical equipment for mining and construction, at the turn of the millenium there will be an essential breakthrough which will be related to the changeover to new energy bearers. Gradually crowding out pneumatics, there will be extensive spreading of hydraulic (including hydraulic shock devices) and electric drives for breaking down and transporting mining mass. New methods will be developed for breaking down mining mass (plasma, discharge and laser) and new geotechnological means of extracting minerals on a large scale (lifting gasification of coal and hydraulic extraction, underground and glomeroblastic leaching).

The creation of highly productive new technical equipment and means of controlling mining work will determine the preferential development of open-pit methods of extraction, especially at coal deposits, and further deepening of mining work because of the extraction of ores of ferrous and nonferrous metals--the latter is impossible without the development of physical instrument observations.

3. One can expect an increase in the development of the energy (because of coal) and ore base of 2-3-fold as compared to 1980. In the coal industry this will take place as a result of the development of the Kuzbass and the Katek. This depends strongly on accelerated development of methods of deep processing of poor coals into liquid fuel and gas synthesis. On the whole, in addition to the development of hydraulic energy, petroleum, gas and other sources, of fundamental significance for Siberian industry (metallurgy, machine building and instrument building) will be comprehensive assimilation of solid minerals--coal and ores of ferrous and nonferrous metals.

Director of the Institute of Catalysis of the Siberian Branch of the USSR Academy of Sciences, Corresponding Member of the USSR Academy of Sciences, K. I. Zamarayev:

1. As I understand it, not only in the next issue, but also in this one you are suggesting looking 30 or 40 years into the future? I think that during these years we shall achieve a qualitatively new kind of advancement in the deep level, the atomic and molecular level, and the explanation of the mechanisms of all three of the main kinds of catalysis--homogenic, that is, catalysis in solutions, heterogenic, that is, catalysis on the surface of solid bodies, and fermentative (biological) catalysis. The knowledge achieved here will be a qualitatively new foundation both for searching for better catalyzers and catalytic processes and for mathematical modeling and optimization of industrial catalytic equipment. The possibilities that can be revealed here are truly immense. For example, one can hope to design catalyzers which combine impressive selectivity of actions and the gigantic amount of activity that are inherent in the best biological catalyzers with the length of continuous operation that is inherent in the best heterogenic catalyzers.

I think that in the future the development of catalyzers will become something like the designing of various structures in modern microelectronics. In one nucleus of a complicated catalyzer they will install the more simple elements which play the role of unique microreactors. Each of them will carry out their own simple chemical reaction and at the same time they will be like microplants where there is a complex chain of chemical transformations. Having loaded this kind of complex catalyzer in an industrial reactor we will be able to obtain in one set of equipment substances which today cannot be obtained without constructing an entire chain of many sets of equipment.

2. First of all, I hope that by the year 2020 we will have succeeded in considerably reducing the path from the time of the generation of a new catalyzer or process in the investigation laboratory until the time of its extensive utilization in industrial practice. In this case one can expect that by this year the aforementioned plant-reactors will have become a reality....

Further, one can expect that in the next decades, because of the introduction of new catalyzers with high selectivity of action, there will be a sharp decrease in the volume of wastes from chemical productions.

On the basis of the achievements of catalytic coal chemistry and catalytic chemistry of methane profitable industrial processes will be developed for obtaining additional products of petroleum processing not from petroleum raw material, but from coal and natural gas.

One of the most interesting features of the period under consideration will apparently be the expansion of the sphere of practical utilization of catalysis far beyond the boundaries of "pure" chemical branches of industry. For example, one can expect extensive introduction of catalysis into energy engineering. One can also speak of new, even better methods of burning fuel in the presence of catalyzers, including in devices like the fuel elements

that directly produce electric energy. One can also speak about the development of catalytic processes for saving and subsequently utilizing energy at the necessary moment, which is produced by the nuclear energy installations of the future. And also about photocatalytic systems for producing ecologically pure fuel using solar energy, for example, through breaking down water to obtain hydrogen....

3. One can assume that this influence of science on the development of the productive forces of Siberia will be significant and on many planes. It is probably in Siberia, where there is a great deal of gas and coal and at the same time relatively few working hands, that it would be expedient to begin the introduction of new industrial chemical processes that are based on natural gas and coal as raw materials and comprehensive waste-free productions which will be based on the utilization of "reactor-plants" which were mentioned above.

As for plants that are operating according to technologies from the end of the 20th century (and these plants will probably still be in existence by the year 2020), providing them with catalytic devices to eliminate harmful discharges will make it possible to reliably protect residents of Siberian cities and Siberian nature from the harmful effects of these discharges.

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ACADEMY OF SCIENCES ELECTS NEW MEMBERS

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 6, Jun 85 pp 66-78

[Article: "New Reinforcements"]

[Text] The regular elections to the USSR Academy of Sciences were held at the end of December 1984. For the division of economics the following active members were elected:

Aleksandr Ivanovich Anchishkin, Ivan Illarionovich Lukinov, and Aleksandr Aleksandrovich Nikonov.

Elected as corresponding members of the USSR Academy of Sciences were: Leonid Ivanovich Abalkin, Viktor Vatslavovich Volskiy, Aleksandr Grigoryevich Granberg, Vitaliy Vladimirovich Zhurkin, Vadim Andreyevich Medvedev, Nikolay Yakovlevich Petrakov, Stepan Aramaysovich Sitaryan and Aleksandr Nikolayevich Yakovlev.

Brief information about the new active members and corresponding members of the USSR Academy of Sciences in the Division of Economics is presented for the readers' attention.

Aleksandr Ivanovich Anchishkin

Professor of the Moscow State University imeni M. V. Lomonosov, born 1933, Russian, member of the CPSU, corresponding member of the USSR Academy of Sciences since 1976, doctor of economic sciences.

A. I. Anchishkin is a specialist in the area of the theory of socialist reproduction, planning and prognostication of the national economy, macroeconomic modeling and economic problems of scientific and technical progress. He is the author of more than 60 scientific works, including the monograph "State Planning" (1966), "Rates and Proportions of Economic Development" (1967), "Economics, Management and Planning" (1968), "Prediction of the Growth of the Socialist Economy" (1973), "Scientific and Technical

Progress and Intensification of Production" (1981). He participated in preparing the textbook entitled "Planning the USSR National Economy" (1968, 1973).

The main areas of A. I. Anchishkin's research are:

the development of the theory of the growth of the socialist economy, methods of analysis and prediction of rates and factors in economic growth, theoretical methods of measuring economic growth, including the theory and methods of measuring extensive and intensive economic growth,

the theory and methods of national economic prognostication,

theoretical and applied problems of analysis and prediction of economic aspects of scientific and technical progress.

The issues and methods developed by A. I. Anchishkin have been given practical application when substantiating the prospects for the development of the Soviet economy. A. I. Anchishkin participated directly in drawing up the five-year plans for the economic and social development of the USSR, the general perspective for the 20-year period and the development of comprehensive programs for scientific and technical progress.

A. I. Anchishkin is doing a large amount of scientific-organizational and public work, he is the deputy chairman of the Scientific Council of the USSR Academy of Sciences and the State Committee for Science and Technology for Problems of Scientific-Technical and Socioeconomic Prognostication, the deputy academic secretary of the economics division of the USSR Academy of Sciences, the deputy editor-in-chief of the journal IZVESTIYA AN SSSR. SERIYA EKONOMICHESKAYA and the leader of a faculty methods seminar.

Ivan Illarionovich Lukinov

Vice president of the UkrSSR Academy of Sciences, chairman of the section on social sciences of the UkrSSR Academy of Sciences, director of the Institute of Economics of the UkrSSR Academy of Sciences, born 1927, Russian, member of agriculture, and also the agro-industrial complex as a whole. He is the author of more than 200 scientific works. The most important of these are: "The Formation of the Agro-Industrial Complex of the USSR and Paths of Its Development" (1981), "Economic Foundations of the System of Agriculture" (1975), "The USSR Food Program, Its Tasks and Ways of Implementing Them" (1982).

A. A. Nikonov has developed a methodology and specific methods for substantiating systems for stable farming under modern conditions. On his initiative and under his leadership research has been organized on economic relations between agriculture and other branches of the agro-industrial complex, the social development of rural areas and the problem of systems for carrying out agriculture.

A. A. Nikonov participates actively in the development of economic problems of the USSR Food Program. Under the leadership of A. A. Nikonov regional models of systems of agriculture have been developed as have a model for the country's grain farming. He is the initiator of extensive introduction of computers and mathematical methods into scientific research in agriculture.

Leonid Ivanovich Abalkin

Department head of the Academy of Social Sciences under the CPSU Central Committee, born 1930, Russian, member of the CPSU, doctor of economic sciences, professor.

L. I. Abalkin is a specialist in the area of political economics and the author of more than 250 scientific works, including the monograph "Political Economics and Economical Politics" (1970), "Economic Laws of Socialism" (1971), "The Economic Mechanism of a Developed Socialist Society" (1973), "Final National Economic Results: Essence, Indicators and Ways of Increasing Them" (1978), "The Economic System of Socialism" (1980) and "Dialectics of a Socialist Economy" (1981). In issue No 2 of EKO for 1981 was published an article by L. I. Abalkin, "The Economic Mechanism and the Style of Thinking"

The main areas of L. I. Abalkin's work are:

the peculiarities of the method of political economics of socialism,

comprehensive analysis of the functions of political economics,

the role of the economic policy in the functioning and developing of the socialist economy,

the system of economic laws, forms and methods of their deliberate utilization,

the theory of the economic mechanism and ways of improving it.

L. I. Abalkin does a large amount of scientific-organizational and public work, and he is the chairman of the council of experts of the VAK, the chairman of the Scientific Methods Council of the RSFSR Znaniye Society, a member of the editorial board of the journals VOPROSY EKONOMIKI of the USSR Academy of Sciences and EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA SO AN SSSR. He is a participant in many unionwide, republic and international conferences, meetings, and symposiums, and he regularly delivers lectures and reports.

Viktor Vatslavovich Volskiy

Director of the Institute of Latin America of the USSR Academy of Sciences,

born 1921, Russian, member of the CPSU, doctor of economic sciences, professor, Hero of the Soviet Union.

V. V. Volskiy is the author of more than 170 published works, and more than 70 of them were published abroad. V. V. Volskiy's scientific research is devoted to socioeconomic and political problems of Latin America. He studies the mechanism and the consequences of the dominance of foreign monopolies in the economies of Latin American countries and the position of Latin America in the system of imperialism. In this connection he has published the books "Latin America, Petroleum and Independence" (1964) and "Latin America: A Look at Her Problems" (1972). A number of V. V. Volskiy's works are devoted to investigating the peculiarities of the national liberation and revolutionary movement in Latin American countries. He devotes constant attention to problems of Soviet-Latin American relations.

In recent years V. V. Volskiy has been successfully working on an important political and economic problem: the peculiarities of the genesis, development and the crisis of capitalism in the countries of Latin America under the conditions of dependency. He has published articles on this subject in Soviet scientific publications, in the magazine PROBLEMY MIRA I SOTSIALIZMA and in the theoretical organs of the Latin American communist parties. Under his leadership and with his personal participation they published the monograph "Capitalism in Latin America" (1983) and the two-volume encyclopedic reference work "Latin America" (1979-1982).

V. V. Volskiy has repeatedly represented Soviet science in international forums, he has given a course of lectures at these largest universities in Latin American and other foreign countries, he has been enlisted to work as an expert by the GKNT, GKES, the UN and UNESCO, he has participated in expeditionary work for preparing practical proposals on requests from the governments of Cuba, Peru, Colombia and Venezuela, and he has repeatedly traveled on official business as part of party and state delegations. V. V. Volskiy is the president of the Soviet Association of Friendship and Cultural Cooperation With the Countries of Latin America, the president of the Society "USSR-Uruguay," and a member of the Soviet Committee for the Preservation of Peace. As a professor at Moscow State University imeni M. V. Lomonosov, he trains scientific personnel.

Aleksandr Grigoryevich Granberg

Deputy director of the Institute of Economics and Organization of Industrial Production of the Siberian Branch of the USSR Academy of Sciences, born 1936, Russian, member of the CPSU, doctor of economic sciences, professor.

A. G. Granberg is a specialist in the area of methodology of planning, economic and mathematical modeling, regional economics and distribution of productive forces. He is the author of 236 scientific works, including 10 monographs. Among these are "Economic and Mathematical Analysis of the USSR Interbranch Balance" (1968), "The System of Models of National Economic

Planning" (1972), "Optimization of Territorial Proportions of the National Economy" (1973), "Mathematical Models of the Socialist Economy" (1978), "The Russian Federation in the Unionwide Economy" (1981) and others. A. G. Granberg's articles have repeatedly been published on the pages of EKO.

The main areas of A. G. Granberg's research are:

methodology and methods of constructing planned interbranch balances,

system modeling of the national economy,

development of the productive forces of Siberia.

The results of A. G. Granberg's research are very significant for theoretical analysis of interbranch ties, the typology of models of socialist economics, and the disclosures of their theoretical and cognitive properties and ways of further improving them.

Under the leadership and with the direct participation of A. G. Granberg a large cycle of research was conducted on problems of the development of Siberia as part of the unified national economic complex, the results of which were presented in the Comprehensive Program for Scientific and Technical Progress of the USSR, the "Siberia" Program and other scientific materials of the Siberian Branch of the USSR Academy of Sciences which were sent to central organizations. The methodological foundations of this research are used when substantiating the prospects for the development of a number of regions of the USSR.

For many years A. G. Granberg has been in charge of a department in the Novosibirsk State University imeni Leninskiy Komsomol. He is the chairman of a specialized council for defending dissertations for the scholarly degree of candidate of economic sciences and is a member of a number of scientific councils. He is a member of the editorial boards of the magazines EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA and IZVESTIYA SO AN SSSR. SERIYA EKONOMIKI I PRIKLADNOY SOTSIOLOGII."

Vitaliy Vladimirovich Zhurkin

Deputy director of the Institute of the United States and Canada of the USSR Academy of Sciences, born 1928, Russian, member of the CPSU, doctor of historical sciences, professor, winner of the USSR State Prize.

V. V. Zhurkin is a specialist in the area of international relations and foreign policy. The main areas of his scientific research are:

military and political problems of the modern world,

the complex of factors forming the foreign policy of the United States and of the entire imperialist system,

limitation of strategic and other arms.

In the area of foreign political research he has formulated the concept of the international political crisis, the stages of development of international conflict, the conditions for their regulation and the role and dynamics of the strategic balance. In the area of research on foreign political strategy he has obtained new conclusions concerning the motive forces of the formation of the U.S. foreign political course and the scope and limits of the influence of the scientific and technical revolution on the military policy of imperialism. He has also obtained conclusions concerning the relationship between the final goals and partial disarmament measures.

Concerning these problems he has published more than 60 scientific works, including the monograph "The United States and International Political Crises" (1975) and "The United States and the USSR in the 1970's and 1980's" (1982). Additionally, he is the co-author of more than 10 works, including "International Conflicts" (1972), "The Nixon Doctrine" (1972), "The Public and Problems of War and Peace" (1976), "Crucial Problems of Disarmament" (1978) and "The U.S. Global Strategy Under the Conditions of the Scientific and Technical Revolution" (1979).

V. V. Zhurkin does a large amount of scientific and organizational work as he is the deputy chairman of the Scientific Council for Economic, Political and Ideological Problems of the United States, a member of a number of other scientific councils of the USSR Academy of Sciences and the Vice President of the Soviet Association of Political Sciences. He is the chairman of the Commission on Problems of Disarmament of the Soviet Committee for the Preservation of Peace, the deputy chairman of the Soviet Committee for the Preservation of Peace, a member of the Bureau of the Scientific Council on Problems of Peace and Disarmament and a member of the Scientific Council of the Stockholm Institute of Research on Problems of Peace.

Vadim Andreyevich Medvedev

Division head of the CPSU Central Committee, born 1929, Russian, member of the CPSU, member of the Central Inspection Commission of the CPSU, doctor of economic sciences, professor.

V. A. Medvedev is a specialist in the area of the theory of public socialist production and the author of more than 100 scientific works, including the monograph "Socialist Production. Political and Economic Investigation" (1976, 1981), "The Development of Cost Accounting in Industry. Questions of Theory and Practice" (1965), "The Law of Value and Material Stimuli in Socialist Production" (1966), "Management of Socialist Production: Problems of Theory and Practice" (1983). A review of the last of these monographs was published in EKO No 12 for 1984.

V. A. Medvedev has made a large contribution to the development of such cardinal problems as the basic economic law of socialism, the public form of factors of production, and the effectiveness and planned nature of production. He has given a developed interpretation of the political and economic essence of the category of the effectiveness of socialist production and an analysis of its variables and interconnections with the scientific and technical revolution. He considers the political and economic aspects of socialist production in close connection with improvement of the economic mechanism and the practice of economic management.

In the works of V. A. Medvedev a large place is occupied by general theoretical problems of developed socialism and questions of public awareness, ideological party work and the development of social sciences. The cycle of work in this area includes the monograph "Developed Socialism: Questions of the Formation of Public Awareness" (1980) and a number of articles in the magazine KOMMUNIST.

V. A. Medvedev participates actively in the training of scientific personnel and the spreading of economic knowledge. For a number of years he has been a member of the presidium of the VAK under the USSR Council of Ministers and a member of the board of the All-Union Znaniye Society.

Nikolay Yakovlevich Petrakov

Deputy director of the Central Economics and Mathematical Institute of the USSR Academy of Sciences, born 1937, Russian, member of the CPSU, doctor of economic sciences, professor.

N. Ya. Petrakov is a specialist in the area of economic and mathematical modeling and methods and mechanisms of managing the economy. He is the author of 100 publications, including the monograph "Profitability and Price" (1964), "Several Aspects of the Discussion on Economic Methods of Management" (1966), "The Economic Reform: The Plan and Economic Independence" (1971), and "Cybernetic Problems of Managing the Economy" (1974). A review by N. Ya. Petrakov of the book by L. V. Braginskiy, "The Effectiveness of Capital Investments and Bank Activity" was published in EKO No 2 for 1984.

The main areas of the scientific research work of N. Ya. Petrakov are:

the system of models for optimizing the mechanism of management of the national economy,

modeling price-setting processes,

improvement of economic management levers and the system of material incentives,

development of the fundamentals of the system of optimal functioning of the socialist economy,

the theory of planned measurement of expenditures and results in the national economy,

construction of the model of planned coordination of the price level, income and the output of products which provide for balance of the physical and cost aspects of planning and management,

models of management of the national economy that take into account the factor of indefiniteness,

economic and mathematical models for evaluating the socioeconomic effectiveness of new technical equipment and prices that stimulate its efficient utilization in public production.

N. Ya. Petrakov conducts a large amount of scientific research and public work and is the deputy chairman of the Scientific Council of the USSR Academy of Science on the problem "Optimal Planning and Management of the National Economy," a member of the editorial staff of the journal VOPROSY EKONOMIKI, deputy chairman of the Interdepartmental Council of the State Price Committee and the USSR Academy of Science for Problems of Price Setting, the USSR representative in the Council of Delegates to the CEMA on Problems of the Environment, and chairman of the Specialized Scholarly Council for Awarding the Scholarly Degree of Candidate of Economic Sciences.

Stepan Aramaysovich Sitaryan

Deputy chairman of the USSR Gosplan, born 1930, Armenian, member of the CPSU, doctor of economic sciences, professor.

S. A. Sitaryan is a specialist in the area of political economics and the theory of socialist reproduction and finance. He is the author of more than 30 publications, including the monographs "National Income of the Union Republics" (1961), "Net Income and the Budget" (1964), "The Economic Reform and the Budget" (1968), "Profit and Crucial Problems" (1970), "Management and Profit" (1979), and "Distributory Relations and Effectiveness of Production" (1980). S. A. Sitaryan's article "Centralization and Independence" was published in EKO No 2 for 1980.

The main areas of the scientific research of S. A. Sitaryan are:

general problems of the formation, distribution and utilization of national income,

problems of cost accounting and the finance-credit mechanism,

the essence of the necessary and added product and their forms under socialism,

the methodology for calculating the national income of the union republics and the norms of the added product,

determination of the content and role of distributory relations in the stage of developed socialism,

development of measures directed toward improving planning and economic stimulation of production.

S. A. Sitaryan actively participates in the training of scientific personnel and highly skilled specialists, being a professor of the faculty of political economics of Moscow State University. He conducts a large amount of scientific-organizational and public work and is a member of the Economic Section of the Committee for Lenin and State Prizes of the USSR in the Area of Science and Technology Under the USSR Council of Ministers and is the honored vice president of the International Institute of State Finances.

Aleksandr Nikolayevich Yakovlev

Director of the Institute of World Economics and International Relations of the USSR Academy of Sciences, born 1923, Russian, member of the CPSU, doctor of historical sciences, professor, deputy of the USSR Supreme Soviet.

A. N. Yakovlev is a specialist in the area of international relations and has made a significant contribution to the development of the theory of international relations, basic problems of the politics of the Soviet Union, the U.S. foreign policy and interimperialist contradictions, the arms race and disarmament, relaxation of international tension, the ideological struggle and criticism of bourgeois political science concepts. He is responsible for five monographs, including those such as "The Ideology of the American 'Empire' Problems of War and Peace and International Relations in Postwar American Bourgeois Political Literature" (1967); "Imperial Ideology: Sources and Doctrines" (1969); "From Truman to Reagan. Doctrines and the Reality of the Nuclear Age" (1984); and more than 100 scientific and popular science articles. A. N. Yakovlev has provided leadership of authors' collectives of a number of training publications and scientific works and he is among the authors of the textbook entitled "Scientific Communism."

In the works of A. N. Yakovlev and also in the collective monographs prepared under his leadership one finds investigations of the key problems of world politics as well as a theoretical analysis of these. The main area of the scientific activity is research on American imperialism and its ideology and foreign policy. In A. N. Yakovlev's works one sees the roots and traces of the appearance and development of the "imperial" ideology of the United States and one can see the mechanism for its transformation into concrete foreign political doctrines which determine the nature of the practical activity of the American state in the world arena.

A. N. Yakovlev regularly participates in the fulfillment of important party and state instructions. He conducts a large amount of scientific-organizational and public work and is a deputy to the USSR Supreme Soviet, a member of the Buro of the Committee of the USSR Parliamentary Group, the chairman of the Association to Assist the UN in the USSR and a member of the Executive Committee of the International Institute of Peace in Vienna.

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11772

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WORK OF MAGAZINE REPORTED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 6, Jun 85 pp 78-82

[Article: "Report on Work of Magazine"]

[Text] At the end of 1984 at a meeting of the section for social sciences of the USSR Academy of Sciences they heard a report on the work of the magazine EKO. The meeting was conducted by the vice president of the USSR Academy of Sciences, Academician P. N. Fedoseyev.

The editor in chief of EKO Academician A. G. Aganbegyan, discussed the existing profile of the magazine, the structure of the reader audience, and the tasks which are being set for the magazine by the editorial board for participation in the implementation of the party's economic policy. "For us," he said, "the concrete orientation points along this path will be the instructions contained in the decree of the CPSU Central Committee, 'On Increasing the Role of the Institute of Economics of the USSR Academy of Sciences in the Development of the Key Problems of Economic Theory of Developed Socialism.' To raise the theoretical level of the articles in EKO, on the one hand, and to make these articles more useful for management practice, on the other--this is the main direction of our efforts. Along with the role of the propagandist of modern methods of management, the magazine is also trying to play the role of the organizer by conducting specific consultations at the plants, organizing clubs of directors, conducting business games, and holding discussions on local problems through the efforts of readers and friends of EKO. A certain evaluation of our efforts is the constant increase in the number of subscribers to the magazine. At the same time the editorial staff is very much in need of a periodic comprehensive evaluation of its activity of the highest professional level. Therefore hearing the EKO report at the meeting of the section of social sciences of the USSR Academy of Sciences is of exceptional value to the magazine."

A multifaceted analysis of the activity of EKO was presented by Academician T. S. Khachaturov, who is in charge of the special commission of the Academy of Sciences which inspected the work of the magazine. He emphasized that the overall impression from the magazine is positive: the editorial board has selected the right orientation and found its position in the ranks of other publications of an economic profile and has also found interesting forms for presenting the material. At the same time, one is struck by EKO's inadequate

participation in the development of theoretical problems of the economy of developed socialism. It is necessary to improve the quality of the materials that are published and the selection of these should be more directed and correspond to a greater degree to the tasks set for economic science in the decisions of the party and the government. Elucidation of questions of scientific and technical progress is not provided systematically enough in the magazine and sometimes it is in random examples (for instance, dirigible construction). The experience in economic construction in other socialist countries is elucidated poorly. It seems that the magazine of the Siberian Branch of the Academy of Sciences could devote more attention to the problems of the development of Eastern regions. The abundance of rubrics leads to a situation in which certain of them fail to appear in an issue for a year or more. One encounters materials that are superficial and dull in form--a result of a certain lag of demandingness on the part of the editorial board.

Academician A. M. Rumyantsev noted that EKO, which is published in Siberia, has become the most widespread all-union economic magazine. The main thing is that the magazine is useful to practical workers. And even though we strengthened the theory section in it, we should not duplicate VOPROSY EKONOMIKI, but rather we must travel our own path. It would be wrong to see in it a narrowly "industrial" publication. The magazine needs a broad economic approach to life for this is the only way we will be able to effectively influence mass awareness and publicize a serious scientific approach to unsolved problems of management. Academician A. M. Rumyantsev made a suggestion to increase the size of each issue in order to more fully reflect the problems that are crucial for today's economy.

Academician A. T. Bogomolov agreed that the commission which inspected EKO had correctly revealed its weak points and had given good advice. But when improving the magazine it is necessary to carefully make sure that it does not lose those qualities which won it its mass audience. In no case should one publication adjust itself to fit another, the speaker emphasized.

Academician N. P. Fedorenko notified those in attendance that the Division of Economics of the USSR Academy of Sciences had heard a report from the commission which had inspected the work of the magazine and also the report from its editor and chief and agreed with the conclusions of the commission on the whole and recommended that the EKO editorial board be guided primarily by the conclusions and instructions of party documents of recent years concerning economic problems. Having emphasized that everyone plays his own role in the system of economic publications, the speaker jokingly concluded: Let us remember that all kinds of magazines are needed!

Three members of the EKO editorial board also spoke at the meeting of the section--doctors of economic sciences S. A. Kheyman and L. I. Abalkin,¹ and also the deputy general director of the AvtoZIL Association for Economics, A. I. Buzhinskiy.

"The magazine cannot 'get around' to many things and the editorial board is clearly aware of this," said S. A. Kheyman. "The processes related to the scientific and technical revolution should be considered at the very highest level, at which the economy, on the basis of an analysis of resources and

expenditures and an understanding of the social goals, points out the directions for research to natural sciences. To be the navigator in this process--such is the responsible task of all economic science and also of our magazine. It generalizes advanced experience and criticizes negative experience--and the combination of these functions comprises its special feature and determines its success. We think that it is necessary to show more profoundly and concretely on the pages of EKO the experience of all socialist countries and to critically interpret the best achievements of industrially developed countries--the United States, Japan, the FRG and others. We cannot ease up in this area. A weak spot of our magazine is the inadequate discussion of organizational and structural reserves, which are extremely great. In general the magazine should suggest to practical workers ways of intensifying the economy."

"The commission that inspected the magazine," said L. A. Abalkin, "reproached EKO for the small number of theoretical articles. The editorial board can see this itself. But one must understand that the difficulties with the articles which give serious theoretical analysis of processes taking place in our society reflect the overall condition of economic theory. Incidentally, this is not a justification. Here too the magazine should act as an organizer and contribute to the development of the theory. The formation of modern economic thinking, as the CPSU Central Committee requires, includes also a breaking down of outdated stereotypes in thinking, which EKO is managing to do to some degree, and also the extremely complicated task of creating a system of positive approaches which are illustrated by concrete examples. Here there is an extremely large amount for the magazine to do."

"I want to emphasize that I am speaking now not as a member of the editorial board, but as a representative of industry," announced A. I. Buzhinskiy. "When speaking with the managers of many enterprises I see that EKO is popular in this environment, it is read, and its advice is heeded. I wish to note especially that it is read not only by the top managers, but also by the rank-and-file designers, shop chiefs and foremen. And when parting with it again today we must say quite definitely that it must not lose a single one of its main qualities which have already determined its popularity: the orientation toward practical assistance above all for production workers, the timeliness of the problems and the boldness of the way they are posed, the clarity of presentation and the attractiveness of the form of transmitting the materials. We should avoid with all our might the appearance of being too scientific. Of course the magazine also has quite a few shortcomings. But they can be seen and we shall hope that they will be corrected."

In the closing statement the vice president of the USSR Academy of Sciences, Academician P. N. Fedoseyev emphasized that from EKO, as one of the magazines of the Academy of Sciences, they expect not merely usefulness to practical workers (it is necessary), but first and foremost serious generalizations regarding a broad range of socioeconomic problems. To raise the theoretical level of the articles does not at all mean to change the profile of the magazine, noted the vice president. The magazine has taken form and it is a good magazine. The editorial board must take a strict approach to the publications and exclude materials that are weak and primitive, and it must give most of the space to the key subjects--scientific and technical progress,

the economic experiment, and domestic and foreign experience. It is necessary to conduct scientific discussions more boldly on the pages of the magazine as well as the consideration of the crucial problems in the national economy. The results should be brought to the point of developing recommendations which enrich practice and science.

The remarks, recommendations and overall evaluation given during the course of the discussion were fully reflected in the decree of the section for social sciences. This profound and interested discussion will serve as an unconditional stimulus for the editorial board and the editorial staff and will help the magazine in its efforts for implementing the party's economic policy.

FOOTNOTE

1. In December 1984 L. I. Abalkin was elected to be a corresponding member of the USSR Academy of Sciences.

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11772

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STRATEGY FOR COMPETITIVE PRODUCTS REVEALED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 6, Jun 85 pp 83-84

[Introduction to articles that follow: "The Strategy of Changing Over to Large-Series and Mass-Produced Products That Can Compete"]

[Text] We frequently speak about scientific and technical progress having in mind only technical innovations, inventions, and the latest scientific achievements. But machines, mechanisms and designs become truly to the credit of scientific and technical progress only when the change from the category of experimental models to the category of industrial products, thus exerting a direct influence on the country's economy.

One of the examples of real scientific and technical progress was the mass and large-series output of AI electric engines in the Ministry of the Electrical Equipment Industry. The experience in the organization of this work was especially attractive to EKO.

It would be impossible to find a branch of the national economy which does not use electric engines. Until recently our industry has produced engines of the series 4A, which are economical and have good operating characteristics and are being marketed successfully in many countries of the world. But the requirements of the day have forced the branch to change over to the output of new products that can compete on the market--electric engines of the series AI (asynchronous, produced within the framework of Interelektro).

There is no doubt that the experience in changing an entire branch over to the production of mass-produced products at the level of the best foreign models deserves attention and dissemination. Moreover the introduction of AI electric engines illustrates the general problems in the introduction and utilization of new technical equipment.

We have already written about these general problems which go beyond the framework of the branch (dissemination and utilization of the engines in the national economy and their repair) (see EKO, No 3, 1985). Today we shall be speaking about the experience of the Ministry of the Electrical Equipment Industry in implementing the comprehensive target program for changing over to the output of mass-produced competitive products and their cooperation within

the framework of Interelektro. This experience is especially interesting because it can be reproduced.

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ELECTRICAL EQUIPMENT INDUSTRY MINISTER INTERVIEWED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 6, Jun 85 pp 84-91

[Interview with Yu. N. Nikitin, deputy minister of the electrical equipment ministry, by L. Shcherbakova: "At the Basis--Target Program"]

[Text] [Question] What has brought about the changeover of the branch to mass production of electric engines in the new series?

[Answer] World practice in machine building shows that such large series of electric engines as the asynchronous ones are updated every 10-12 years. It is during this period that new requirements are formed for electrical machines and new scientific developments appear in the area of materials and designs for engines. This was the situation in world practice at the beginning of the 1980's. Since we were exporting products to dozens of countries, including industrially developed ones, we did not want to lose our position on the world market. The cost of electric energy is increasing now throughout the world, and this tendency will probably continue at least up until the year 2000. We had to take this into account when designing engines of the AI series.

Additionally, a new organization was formed--Interelektro--within whose framework was concentrated the large scientific and technical potential of the socialist countries. This made it possible to raise the level of development and production of engines not only within the country, but also within the framework of Interelektro. Thus the prerequisite for changing over to the production of the new series of electric engines existed.

[Question] As far as we know, this is not the first planned changeover of a branch to the output of mass-produced and large-series competitive products and it is not the only example of a program-target approach?

[Answer] Indeed, this approach has been used in the ministry for many years now.

A little history. Before the war the USSR produced a large quantity of various kinds of asynchronous engines. Practically every plant manufactured its own series. Even now in capitalist countries every electric machine building firm develops and manufactures its own series of asynchronous engines.

As early as the 1930's the USSR raised the question of the need to have unified series of electrical machines. But we did not manage to act on this until during the postwar period.

[Question] And what are the advantages of unified series?

[Answer] On the basis of unified series one can organize deep specialization and broad cooperation of the production of the item and centralize the manufacture of technological fittings and instruments. Unified series facilitate the selection, installation, service and repair of the item during operation as well as the material and technical support.

With the development of science and technology in the area of electrical machine building and the improvement of the properties of electrical equipment materials, unified series have been improved. At the same time the growing requirements placed on electrical machines were taken into account. In 1960 at the All-Union Scientific Research Institute of Electrical Machinery (VNIIEM) they developed a second unified all-union series of asynchronous engines with capacities of from 0.6 to 100 kilowatts--A2-A02. For the first time in the world practice of electrical machine building they used the method of calculation with a search for the optimal variant in terms of the minimum expenditures during production and operation. Electronic computers were also used for the first time to do these calculations. In the A2-A02 series the expenditure of materials was reduced by an average of 25 percent, and the efficiency factor was increased by an average of 1.7 percent.

During the 1960's it became necessary to create new modifications. Because of this in 1970 a decision was made to create the new 4A series of asynchronous engines which corresponded to the future level of machine building in 1975-1985 and was quite competitive on the world market. In order to achieve the goal that was set, a comprehensive program was developed which encompassed all design, technological and planning work for technical reequipment of enterprises of the branch, and also for creating and assimilating the production of new materials. As a result of the introduction of the 4A series the national economy has already saved 250,000 tons of electrical steel and 30,000 tons of armature copper, and the operation of the engines that have been manufactured is providing an annual savings of 7.5 billion kilowatt-hours of electric power.

The work done by technological organizations made it possible to reduce the labor-intensiveness of the manufacture of electric engines of this series by half. These are the results that can be achieved through joint work of designers and technologists, beginning with joint development of the technical assignment.

With the introduction of the 4A series into production electric machine-building plants were reequipped. Automated lines replaced the universal equipment for machine processing. Instead of the less productive presses for stamping they have automated presses with up to blows per minute. The traditional manual labor for inserting coils was replaced by mechanized labor on special coiling machines....

During the 1960's technological institutes were created in the branch and in the 1970's plants were constructed for manufacturing technological equipment for specific processes. Without them it would have been unthinkable to create and introduce the 4A series.

Other socialist countries also participated in manufacturing technological equipment for production of the 4A series. Thus the GDR manufactured automated lines for mechanical processing, Czechoslovakia--automated presses, Hungary--coating installations, and Poland--painting lines. The creation of the 4A series raised domestic electrical machine building to a new level. Development was carried out in the same way for other electrical machines--low-voltage equipment, transformers, semiconductors, and light bulbs....

[Question] Consequently, the branch has formed a system and certain principles for the changeover to mass-produced and large-series output of competitive products. What are these principles?

[Answer] Yes, we have accumulated a certain amount of experience. The branch has created a system for the development and introduction of new series of electrical equipment products. What are its constituent parts?

The very first stage is the development of a comprehensive program for changeover. Carrying out individual stages of this program should be effectively supervised. To this end we are creating an overall directive network schedule which encompasses all stages and all participants in the program.

The head designer and the head technologist of the series are appointed by an order of the minister. The head designer's service is responsible for the technical level of the series. The head designer coordinates all technical specifications, technical assignments and all documentation regardless of which institute is developing individual sizes of electric engines. All decisions regarding changing the design are also made by the head designer. His deputies who are leaders of design institutes and buros engage in the development of specific engines. Questions that arise are brought before the scientific and technical council under the head designer. Depending on the complexity of the program and its national economic significance, a scientific manager is also appointed for the program. The head organization is determined, and this is usually a scientific research institute or design buro in the branch.

Under modern conditions it is possible to change over to principally new products by relying on the potential of a number of ministries and departments. This involves utilizing progressive materials and batching items, changing technology and introducing modern equipment into production. Therefore when planning, for example, the 4A series, a task was set to develop and create domestic materials taking into account the modern achievements of the metallurgical, chemical and other branches of industry. More than 20 scientific research organizations and about 30 plants and factories of six union ministries were enlisted to carry out this task. The problem was solved with unified interbranch comprehensive programs and network schedules. As a result, by the beginning of the output of the engines of the 4A series certain

new electrical equipment materials had been created and their production had been organized. I shall give individual examples. Thus for the magnetic core of the engines they selected cold rolled electrical steel which domestic industry had not produced up to that time. In terms of the magnetic properties and the quality of the surface it considerably surpasses hot rolled steel and can be delivered in rolls of strips with the required width, which sharply increases the productivity of stamping work. The application of cold rolled electrical steels in the engines of the 4A series along with other indicators made it possible to improve their energy parameters with the simultaneous reduction of weight per unit of capacity.

With the comprehensive approach the entire volume of scientific research, experimental-design and technological work is completed two or three times as quickly as it was the development of the previously produced less complicated series. Within a year after the beginning of the development of the 4A series an experimental batch of engines was produced, and their industrial output began in 1971. It is typical that each changeover of enterprises of the subbranch to the output of electric engines of the new series is being carried out without reducing the growth rates of the overall output of products, and this is the best evidence of the effectiveness of the system of program management. Such is the case now as well: planners from eight branches of our national economy are working along with designers and technologies under the program for changing over to the output of electric engines of the AI series.

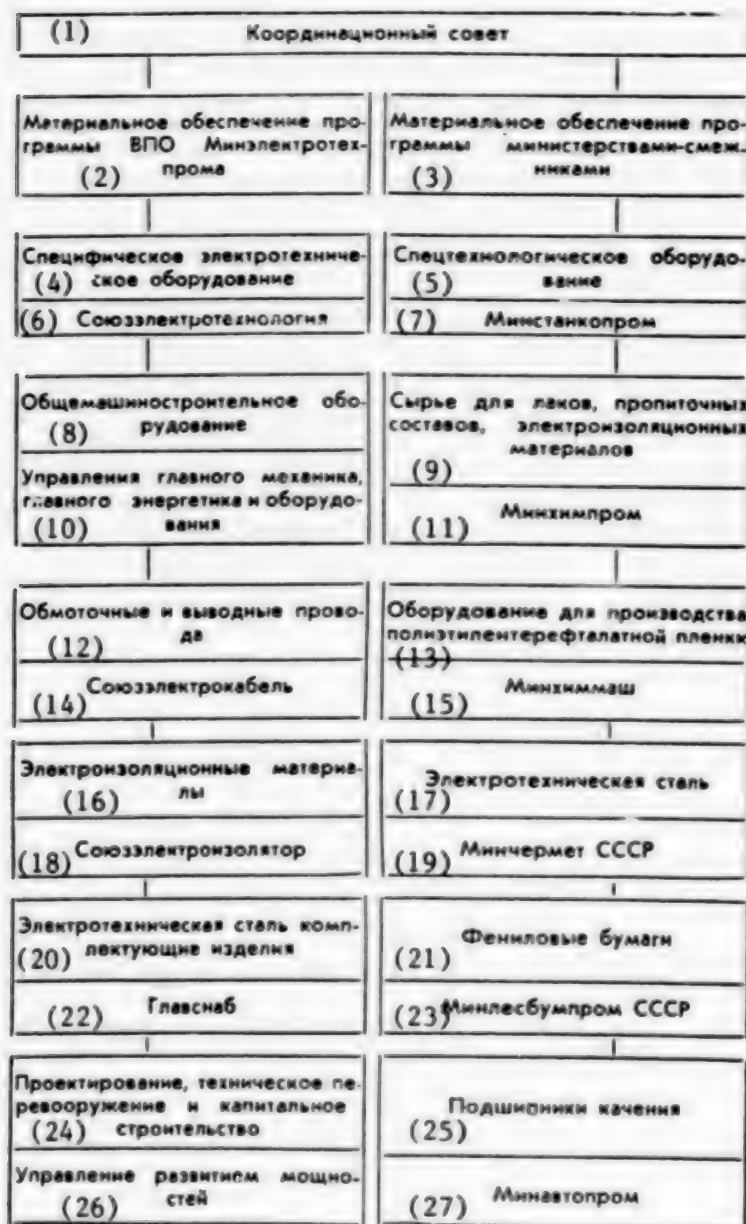
[Question] How are representatives of these branches directed toward the final result?

[Answer] The creation of engines of the AI series is envisioned by the comprehensive program approved by the USSR State Committee for Science and Technology. Therefore all of its participants are taken into account through the USSR Central Statistical Administration.

In order to bring together the interests of the branches that supply materials and batching items in our branch, when planning the series of electrical equipment products we issue joint orders from two ministries: the Ministry of the Electrical Equipment Industry and, for example, the Ministry of the Machine Tool and Tool Building Industry, Ministry of Ferrous Metallurgy and so forth. These orders stipulate the responsibilities of the branches for providing for the fulfillment of the program. Interbranch operations groups are created for daily leadership and supervision, and they include leading specialists of branches for various areas.

[Question] But is it really true that all of the things you have listed will lead to an interest on the part of the associated branches in fulfilling the agreements?

Organizational Chart of Control of Creation and Assimilation of AI Series Electric Engines in Production



Key:

1. Coordination council
2. Material support for the program of the VPO of the Ministry of the Electrical Equipment Industry
3. Material support for program of associated ministries
4. Specific electrical equipment
5. Specialized technological equipment
6. Soyuzelektrotekhnologiya

7. Ministry of the Machine Tool and Tool Building Industry
8. General machine-building equipment
9. Raw material for varnishes, solvent compounds and electrical insulation materials
10. Board of the head mechanic, chief of energy and equipment
11. Ministry of the Chemical Industry
12. Coiling and output wires
13. Equipment for producing polyethylene terephthalate
14. Soyuzelektrokabel
15. Ministry of Chemical Machine Building
16. Electrical insulation materials
17. Electrical steel
18. Soyuzelektroizolyator
19. USSR Ministry of Ferrous Metallurgy
20. Electrical steel for batching items
21. Phenyl papers
22. Glavsnab
23. USSR Ministry of the Timber, Pulp and Paper, and Wood Processing Industry
24. Planning, technical reequipment and capital construction
25. Roller bearings
26. Control of development of capacities
27. Ministry of the Automotive Industry

[Answer] You see, the products of the electrical equipment industry are used so extensively and their level influences to such a degree the level of the most varied items that there is not a branch which would not be interested in its development. And indeed in the stages of scientific research and experimental-design developments everything goes well, as a rule. But as soon as the matter reaches the supply of series production of our branch with certain materials and batching items, here is where we encounter difficulties. The supply branches are not ready to provide for all of our needs. Incidentally, you have already written about this in the sixth issue of EKO for 1983 in the conversation entitled "The Quality of the Plans and the Work of the Enterprise." Little has changed since then. Apparently programs similar to the development of the AI series require more constant attention from the State Committee for Science and Technology and the USSR Gosplan. It is impossible to achieve a radical change through the efforts of only one branch. It is necessary for the "superbranch" agencies to intervene more energetically. But so far the program for the development of the AI series is proceeding fairly successfully. In 1984 120,000 AI engines were manufactured, and in 1985--450,000. During the course of the next five-year plan engines of the 4A series will be completely removed from production. The first AI engines were introduced at the Ukrelektromash Association which is well-known in the branch. The head enterprise of this association--the KhELZ Plant (Kharkov)--has produced the first 120,000 engines. One must say that an immense amount of work has been done both by the collective of the plant and by the general director of the association and the director of KhELZ, N. P. Belous. This made it possible for the enterprise to be the first in the branch to begin to introduce the new series. In 1985 the Poltava Plant of this association began to produce electric engines of the new series. Thus

the Ukrelektromash Association will make the lion's share of the new electric engines during the first 2 years.

[Question] As we know, until recently enterprises had almost no interest in introducing new products. Did something change when the branch changed over to the economic experiment?

[Answer] According to the conditions of the experiment, the increase in profit at the enterprise is made directly dependent on the assimilation of new products. Thus there is a certain stimulus for their introduction. Additionally, the AI series will have the State Emblem of Quality. It is included among the especially important and complicated items and will be recertified for the Emblem of Quality every 5 years, instead of every 3 years. These products will have their own increments for quality and complexity. But the experiment does not remove all the contradictions. Fortunately, in addition to the material factor there is also the moral factor--the output of high-quality products at the level of the best world models. So far the introduction of new technical equipment is being kept at the level of moral and disciplinary factors. But, of course, the introduction is proceeding more successfully in places where the managers of the enterprises are people who think progressively, who are not afraid to take a risk, and who are guided by statewide interests.

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11772

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IMPORTANCE OF DESIGNS STRESSED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 6, Jun 85 pp 92-100

[Article by V. I. Radin, doctor of technical sciences, head designer of the Zavod imeni Vladimir Ilich Production Association, head designer of the unified series of asynchronous engines of the Ministry of the Electrical Equipment Industry (Moscow): "Everything Begins With the Design"]

[Text] Almost a hundred years have passed since the Russian engineer M. O. Dolivo-Dobrovolskiy designed the three-phase asynchronous engine. Since that time these engines have won a leading position among electrical machines. They have become the main transformers of electric energy into mechanical energy and, in the opinion of specialists, in the foreseeable future they will remain the basis of electric power for the majority of mechanisms in industry, agriculture, trade and daily life. Now this type of engine consumes more than half of all of the electrical energy produced in the world and as the energy availability for labor and life increases, the proportion of electric energy consumed by these machines will increase.

How does one explain the fact that they are so widespread? The simplicity of the design, the high durability and the high efficiency factor, which reaches 95 percent in large machines. For comparison let us note that the efficiency factor of the steam engine is 6-8 percent, and internal combustion engines--12-16 percent.

The most widespread in the national economy are the low-voltage (220-380 volts) three-phase asynchronous engines with capacities of from 0.5 to 400 kilowatts. They consume more than 40 percent of all the electric energy that is produced and their installed capacity is greater than the installed capacity of all the electric stations in the USSR and amounts to more than 300 million kilowatts.

About 100,000 people are engaged in the manufacture of asynchronous engines in the USSR, and there is an immense army of electrical maintenance men (more than 1 million) engaged in their service and repair. Expenditures on servicing asynchronous engines amount to up to 6 percent of the overall expenditures on service of all equipment installed in our country. From the figures that have been given one can see the role played by asynchronous

engines in the national economy. The tendencies and problems of their development which are related to planning, manufacturing, selecting and utilizing them are of great interest to our country's economy.

Let us take a look at the role of designers in various stages of the planning and introduction of the AI series.

Planning the Series

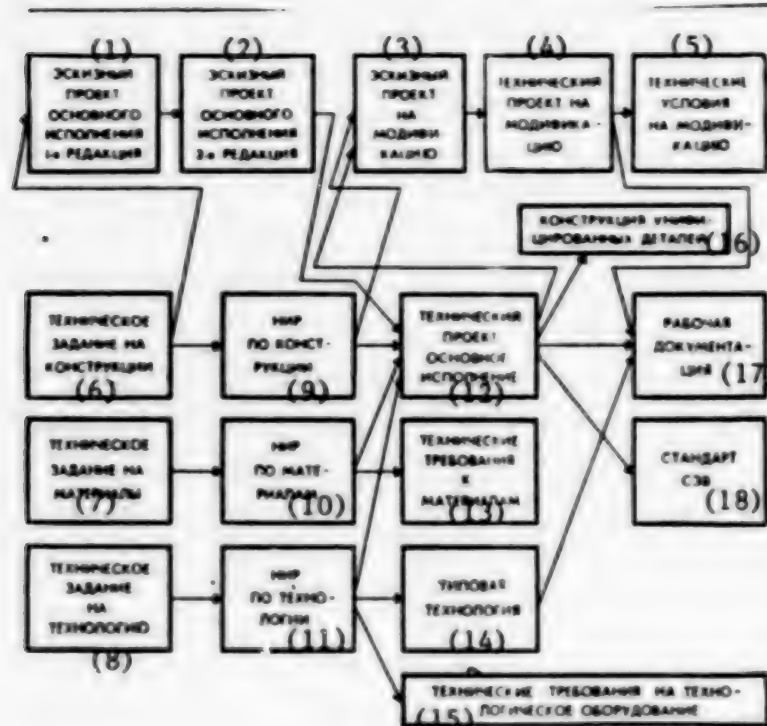
We have accumulated good experience in the creation of unionwide series of asynchronous engines (for example, the 4A). But with the creation in 1973 of the Interelektro organization, which includes nine socialist countries, it became possible to use in planning not only our country's potential, but also the best design forces of our friends. It became possible to combine all the best that has been accumulated in each of the countries in the area of the development and production of asynchronous engines. Joint utilization of this common potential has made it possible to raise the level of developments and to accelerate them.

What organizational forms have our relations taken within the framework of Interelektro? We have concluded an agreement and developed a comprehensive program for scientific and technical cooperation in the area of the development and assimilation of low-voltage asynchronous engines. For cooperation in this work we have created the United Scientific and Technical Council for Asynchronous Engines (ONTS AD). Each year the United Design and Technological Bureau (OKTB) meets. It consists of the leading specialists of the socialist countries in the area of electric engines. A joint cycle of research work has been conducted. It encompassed 100 subjects related to calculation, design, technology of manufacture and materials for asynchronous engines. The stages of the development of the series are shown in Fig. 1.

The utilization of the country's scientific and technical potential made it possible to reduce the time periods for development and considerably raise the technical level of electric engines, and it also created a solid basis for specialization and cooperation both in the engines themselves, and in individual parts, instruments and technological fittings for them.

A clear-cut policy was established for conducting joint scientific research work. After the coordinating country and the participating countries were determined a work schedule was developed. It is regularly monitored by the ONTS AD. As a result unified methods were created for all kinds of accounts, recommendations for selecting materials and designs for all units both for basic use and for modifications (see Fig. 2), and the most efficient technological processes were also determined. The results of the scientific research work lay at the basis of the creation of the AI series. The combined design and technological bureau first submitted a sketch and then technical plans for the series. A CEMA standard was also developed: "Asynchronous Engines. Technical Requirements." In 1984 assimilation of the AI series began in the USSR. During 1985-1990 the series will be completely introduced both in our country and in other socialist countries.

Stages of Creation of Engines in A1 Series



Key:

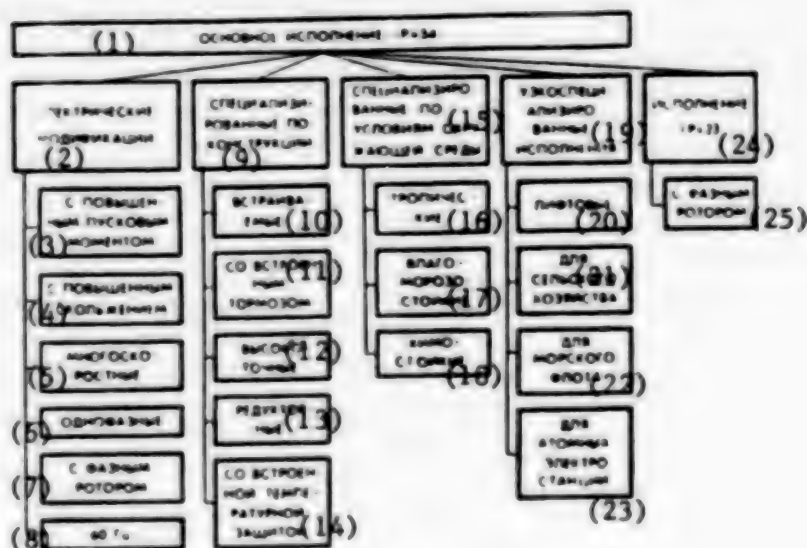
1. Rough design of basic execution, first edition
2. Rough design of basic execution, second edition
3. Rough design for modification
4. Technical design for modification
5. Technical specifications for modification
6. Technical assignment for construction
7. Technical assignment for materials
8. Technical assignment of technology
9. Scientific research work for construction
10. Scientific research work for materials
11. Scientific research work for technology
12. Technical design, basic execution
13. Technical requirements for materials
14. Standard technology
15. Technical requirements for technological equipment
16. Design of standardized parts
17. Working documentation
18. CEMA standard

The AI series has taken into account many modern tendencies in electrical machine building.

As was already mentioned, asynchronous engines are the largest consumers of electric energy. Firms of capitalist countries have begun to increase the

energy indicators of asynchronous engines through increasing the expenditure of active materials (electrical steel, armature copper) by 25-30 percent. As the optimization calculations showed, this path is uneconomical for our country and the cost of the overexpended materials will not be recouped within acceptable time periods through the cost of the electric energy that is saved. But in the AI series we have applied design and technical measures which provide for an increase in the energy indicators of the engines without increasing the expenditure of materials.

Diagram of Modification of First Order of AI Series



Key:

- | | |
|--------------------------------|--|
| 1. Basic execution, R=54 | 14. With built-in temperature protection |
| 2. Electrical modification | 15. Specialized for environmental conditions |
| 3. With increased startup time | 16. Tropical |
| 4. With increased slipping | 17. Moisture- and frost-resistant |
| 5. Multispeed | 18. Chemical-resistant |
| 6. Single-phase | 19. Narrowly specialized performances |
| 7. With phase rotor | 20. Elevator |
| 8. 60 grams per quintal | 21. For agriculture |
| 9. Specialized for design | 22. For the maritime fleet |
| 10. Built in | 23. For atomic electric power stations |
| 11. Built in brak | 24. Execution (R=23) |
| 12. High precision | 25. With phase rotor |
| 13. Reduction | |

Another modern tendency is a reduction of the noise of electric engines. The energy availability for labor is increasing all the time and therefore in order to maintain a noise level that corresponds to existing sanitary norms (85 decibels), it is necessary every 5 years to reduce the level of noise of electric engines by approximately 3 decibels. In the AI series, because of a

whole number of design and technological measures, the noise level has been reduced by 10-15 decibels as compared to the 4A series.

Another factor which was taken into account when planning the series of electrical machines is international standardization within the framework of the International Electrical Equipment Commission (IEEC). Recommendations have been developed for design performance, startup and other specifications. The AI series satisfies all these recommendations.

The AI series envisions the same electrical, climatic, specialized and narrowly specialized modifications as are found in the 4A series. In spite of the large number of modifications and uses, their level of unification with the basic model is quite significant. The coefficient of unification is 0.8-0.95.

The overall economic effect from the introduction of the AI in the USSR amounts to 23 million rubles per 1 million manufactured engines, that is, more than 200 million rubles a year. A considerable economic effect will be achieved in the other countries participating in Interelektro as well.

How To Reduce Losses?

The quality of the electric engine depends on the quality of the materials, technology and manufacture.

Let us discuss the quality of materials and batching items.

Electrical steel. When changing over to the production of electric engines of the 4A series, in keeping with a joint decision of the ministries of our branches, we were to have obtained steel of the grade 20-13. But the Ministry of Ferrous Metallurgy did not fulfill its commitments and delivered steel of a considerably inferior quality. What does this lead to? We are producing engines with an efficiency factor that is lower than the permissible level, and we are losing 1-2 percent of the efficiency factor. And in the country as a whole this amounts to large losses of electric energy. The AI series is based on 22-12 steel with an insulating coating. It is necessary for the Ministry of Ferrous Metallurgy to fulfill its commitments and provide for the delivery of the steel for the entire AI series.

Bearings. One must say that the bearings industry has done a large amount of work in designing the 4A and AI series for raising the technical level of bearings. Practically new bearings with prominent lubrication were created. This considerably facilitates the servicing of the electric engines. In the AI series we envisioned bearings of an even higher class. The significance of the quality of bearings is shown by this fact. Losses in one bearing which seem insignificant at first glance end up to be losses of an immense quantity of electric energy.

Electrical insulation. In our country we have developed good insulation material--Finilon. On the basis of this we have created cardboard and paper for electrical insulation. But for 15 years now the chemical industry has been unable to arrange the production of Finilon fibers, in spite of the

programs of the USSR State Committee for Science and Technology and many decisions, commitments and decrees. We either have to use substitutes which reduce the reliability of the machines and their service lives or import some of the insulation.

Paints. The chemical industry is poor at supplying the branch with penetrating paints and paints for enameling wires. And their quality is not good. All this again reflects on the quality and reliability of the electric engines.

I wish to emphasize once again that we do not order all of these materials "from off the street," but in keeping with an agreement with the branches which are to produce them. The contracts are confirmed by the comprehensive program of the State Committee for Science and Technology and the ministers issue general orders. But when it gets to the point of production some materials are completely lacking while others are of poor quality.

But the greatest reserves for economizing on electric energy lie hidden in the operation of electric engines. A change in the voltage in the network, a lack of symmetry of the phases and other deviations lead to increased losses. It is also known that in many cases electric engines operate with alternating load, which is extremely disadvantageous. Recently in the United States for electric engines with capacities of up to 3 kilowatts they have begun to extensively utilize semiconductor voltage regulators which reduce the voltage of the network feeding the electric engine when the load is reduced and thus maintain a high level of efficiency factor when the load changes. To be sure, the cost of these devices is frequently more than the cost of the electric engine itself, but in a whole number of cases they are recouped through savings on electric energy. Research conducted in our country shows that it is expedient to apply these regulators in cases where the electric engines have an annual operating time of no less than 3,000 hours and work with significant changes in the load. In the textile industry, for example, the use of these regulators could provide for a savings on electric energy of about 4 million kilowatt hours a year.

A large effect is produced by the application of regulated electrical wire which provides for a wide range of change in the frequency of running. Approximately 60 percent of the entire stock of electric engines is used for running ventilators, compressors, blowers and pumps. As a rule, all these mechanisms run with a constant speed. And in the majority of cases it is more expedient to regulate their speed. For example, the use of a regulated electric drive in an air conditioner for a work building with an electric engine with a capacity of 25 kilowatts which provides for a change in the running speed depending on the temperature of the air (time of day, time of year and so forth) produces a savings of 30,000 kilowatt-hours of electric energy a year.

Calculations show that extensive introduction of a regulated electric drive in the national economy will save about 10 percent of all the electric energy that is produced. But this requires more extensive development of production of semiconductor instruments and semiconductor transformers which are based on them.

Designers and Production

One must say that the organization of purely design work and interaction with the scientific research institute, in spite of the diversity of these ties, is much less complicated than interaction with enterprises during the time of the designing and introduction of new technical equipment. And yet success in this matter depends fully on the interests of both parties in introducing the new mechanism or machine. The complexity of this process is understandable. The enterprise is a "living organism" with a large number of workers and a plan on whose fulfillment their well-being depends. Therefore the introduction of new technical equipment is a painful process.

Each enterprise has its own equipment and its own technology which may not satisfy or may not fully satisfy the demands of the designers who are planning the item. Here the designers have to make compromises and search for new decisions while allowing the quality of the electric engines to deteriorate as little as possible. This is possible only when the designers are well aware of the technical condition of the plants of the subbranch and also the prospects for their development. Hence the first condition is close interaction with industrial enterprises of the subbranch. The head designer must know all of them and their deputies--and he must know the details of the possibilities of these enterprises which will be producing the products.

The second condition is constant contacts with engineering and technical personnel of the enterprises. We try to keep them up with all of our affairs having to do with the development and introduction of asynchronic electric engines. We discuss what is being done and what we intend to do, we disclose the future to them, and we prepare them for the idea of the inevitability of the changeover to new products. They think on a larger scale and the main thing is that they become our allies.

The third condition is enlisting plant design bureaus in the development of series-produced electric engines. But here it is necessary, in our opinion, to maintain one condition: the development should be carried out according to unified documentation--carbon copies. And the design organizations of the branch should have the carbon copies. That is, we do not give copies to the plants. This is our firm position.

At one time when developing a second series of electric engines we had plants which had copies. But this led to pathetic results: every plant made design changes which affected the quality of the electric engines.

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ECONOMICS OF DESIGN WORK DISCUSSED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 6, Jun 85 pp 100-103

[Article by E. K. Strelbitskiy, doctor of technical sciences, All-Union Scientific Research and Planning-Technological Institute of Electrical Machine Building (Vladimir): "Economics and Design"]

[Text] Economic evaluations of asynchronous engines are now being conducted in all stages: from the planning of predesign research to the selection and application of engines in the national economy.

Where Does the Creation of a New Series Begin?

The basic task when creating a new series is more complete satisfaction of the demands of the consumers with reduced expenditures in the national economy.

Algorithmic and program support of optimal planning is fairly well developed and makes it possible to find the best variant of an engine within acceptable time periods with satisfactory precision. It would seem that all the person doing the calculations would have to do would be feed in to the computer the initial data which represent the properties and costs of materials, the requirements of technology and the consumers (a total of approximately 120-150 indicators) and the program for optimization--and the best variant would be found automatically. In reality the situation is much more complicated.

The initial data reflect the interconnection between the electric engines and other systems of the national economy and they themselves are subject to optimization. The values of the majority of initial data are found through compromise since a change in the initial figure, as a rule, produces a savings in one sphere to the detriment of another. For example, an increase in the startup capacity involves a deterioration of the energy characteristics and an increase in the cost of the engine, but in a number of cases it still makes it possible to reduce the installed capacity or intensify the technological process. Another example: a reduction of proportional losses of electrical steel involves an increase in the prices of steel but leads to the creation of a more economical engine.

Representatives of a whole number of branches participate in the creation of each series: metallurgy, chemistry, the paper industry, machine tool building, bearing construction and so forth.

In terms of the scope and number of internal and external ties modern series-produced asynchronous engines are large systems. The decisions made in individual parts of these systems, as in the examples presented above, necessarily affect other parts and, as a rule, they are contradictory. Therefore an economical approach is expedient even in the stage of the formation of the plan for scientific research work and in the stage of the determination of the requirements for the properties of materials and batching items and the parameters of technological equipment developed for the production of the engines.

In order to describe the system of scientific research work they formulated a complex of parameters which reflect the properties of the objects (materials, units, parts and systems). The degree of influence of technical parameters on the target function and its constituent parts was evaluated with the help of coefficients of influence.

On the basis of matrices of coefficients of influence they formed equations of increments of the target function and its constituents as well as limitations, depending on the technical parameters, sizes and properties of the materials. With the help of these equations they solved many problems concerning purposive management of developments, evaluated the importance of parameters in terms of the influence of their changes on the target function, and found ways of compensating for unsuccessful decisions. In particular, these equations were used when calculating the limit prices for materials and batching items that were being developed: electrical steel, coiling wire and roller bearings.

The Coordinated Nature of Evaluation Documents

In the plan for scientific research work which provides for the creation of the series they envisioned work for creating a system of economic evaluations that are noncontradictory and unified for all subsystems and stages of the development of the series. The lack of unified evaluations can violate the main intent of the creation of the series. The selection of a system of noncontradictory criteria was complicated by the fact that individual departments that provide a juncture between the series and other national economic systems used various criteria for evaluations. In the stage of optimal planning and calculation of the preliminary economic effect they used as a criterion the national economic expenditures; in the stage of the determination of prices the basis was the production cost; and in the stage of certification they took into account neither the production cost nor the economic effect but only the results of the comparison with foreign analogues.

Within the framework of the scientific research work we conducted unified formulas were developed for calculating the economic effect. They were introduced into the corresponding normative documents of the State Committee for Science and Technology, State Committee for Prices and Gosstandart, which guaranteed that the evaluations envisioned in the instructions of the

mentioned departments would not be contradictory. In the formulas they took into account the savings for the consumer from the increased reliability and compactness and also from the reduction of the noise and vibration levels. The increased compactness of an item--the reduction of its size--makes it possible to reduce the necessary amount of production space and in certain cases also the material-intensiveness of the object on which the engine is installed. According to an estimate, about half of the sound volume of noise in the shop of the machine-building plant is made by electric engines. Because of the increased electricity-availability this proportion is constantly increasing. A reduction of the noise level in the shop by one decibel will lead to an increase in the supply of working time of 0.5 percent. This is possible as the result of reducing losses of working time because of partial and temporary disability, increased labor productivity and improved product quality.

Formation of the Appearance of the Series

Having achieved coordination of the evaluation documents it was possible to begin forming the appearance of the series. Since the engines of the AI series were intended for production and operation in 1985-2000, it was necessary to predict all of the basic parameters, including economic ones, for that period. These were primarily prices for electric energy and the length of annual operating time. The proportional harm from the breakdown of engines was proportional to the electricity availability which, according to predictions, would increase. In order for the damage from breakdowns not to increase under these conditions it was necessary to increase the probability of breakdown-free operation of engines during 10,000 hours from 0.9 (as was in the case of the 4A series) to 0.95.

The main factors that determine the appearance of the series are the external diameter of the core of the stator and the design of the covering. In the 4A series the external diameters were greater than those of foreign analogues. Previously when designing the 4A series the external diameter of the stator core was determined according to the heaviest machine. This is the simplest, but not the optimal decision. It would be more correct, although more complicated, to select not the engine with the greatest weight, but the engine which causes the least harm because of deviation from the nominal. This is the more correct since the external diameters were to be made standard for all of the countries belonging to Interelektro. As a result of this approach we had the opportunity to formulate a strategy of action when evaluating the technical compromises between the technological, consumer and design requirements. The changeover to new external diameters produced a savings of 2 percent of the coiling wire and 3 percent of the electric steel.

The amount of the operational expenditures for the engine depends on the efficiency factor of the annual running time and the cost of electric energy. These dependencies were also taken into account when developing the AI series.

The optimal engine, intended for a particular load and particular operating conditions, can be incorrectly selected in terms of capacity, operating characteristics or changes in conditions which are different from the calculated ones. Two kinds of mistakes are possible: either the engine was

selected with surplus characteristics and, consequently, is more expensive; or it was selected with inadequate operating characteristics for the given conditions and, consequently, it can wear out prematurely. In both the former and the latter cases the consumer and the national economy as a whole sustain the damage.

In order to provide for correct application of asynchronous engines the VNIPTIEM created a subdivision for applying engines and established a policy for coordinating them for newly developed mechanisms.

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IMPORTANCE OF CUSTOMER IN PLANNING STRESSED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 6, Jun 85 pp 104-108

[Article by G. S. Kurbatova, candidate of technical sciences, All-Union Scientific Research and Planning-Technological Institute of Electrical Machine Building (Vladimir): "To Know the Destination and To Know the Conditions"]

[Text] When planning and producing any product it is necessary to have clear information about for whom and for what it is needed and under what conditions it will be operated. This is precisely what largely determines the economic effect of its utilization in the national economy. With respect to electric engines it has not been simple to find this. Lists of electrical equipment which are so necessary for research have not been kept for 20 years. During this time essential changes have taken place in the development of the branches, which have led to a redistribution of the stock of engines and to changes in the main consumers. The chemical industry has developed rapidly, there has been intensive electrification of agriculture, and so forth. But still it was necessary to gather the information.

We arranged our work in the following way.

Information was gathered on the stock of electric engines as a whole and the structure of the branches and individual productions were considered. Thus we managed to obtain rough figures about the distribution of the stock of engines among the branches.

Having determined the structure of the stock of engines as a whole we began to study each branch according to the system: structure of the branch (kinds of productions), final product of production, list of the most widespread mechanisms, quantitative evaluations for the application of engines in these mechanisms.

Further work was impossible without a systematization of the mechanisms. It was noted that regardless of the machine or set of equipment in which the engine was used, its function amounted to putting the simplest mechanism into motion, which we shall call the elementary one. For example, a pump. There are many varieties of pumps, but their functional purpose is all the same. We singled out about 40 such elementary mechanisms.

This classification in conjunction with the indicators that characterize the operating conditions was used as a basis for the information system for application (IPS application).

The essence of the system consists in the following. For each engine that was considered, on a special form a line was singled out for entering information, on which using coded designations we entered the indicators of the engine and the conditions for its operation. The set of lines forms a block. The blocks are processed on computers according to a specially developed program. The line for entry contains: the full name of the engine; the operating conditions according to the GOST; the duration of work during a year; the frequency of starts or reverses; the coded designation of the mechanism; the code of the brands for the final application; the ministry that developed the mechanism; the collective that developed the mechanism; and the plant that manufactured it. The application of the coded designation of the mechanisms considerably facilitated the analysis of the blocks of information.

With the help of an information search system for application we created blocks of applications from ministries and departments to the USSR Gosplan; the availability of the engines in the various republics; in the textile, agricultural and other productions; the coordination of the application of the engines, and so forth. The blocks augment one another and when put together they produce a fairly complete information bank.

The analysis of the blocks destroyed our idea about the lack of particular destination of engines of unified series. Each type size has from one to four basic consumers and, consequently, the engines can be planned for particular mechanisms taking into account their requirements. For each type size of engine tables have been drawn up for their most widespread applications and, conversely, for each mechanism we establish the most frequently encountered type sizes of engines. It is known that the number of varieties of engines in a series now reaches 2,600. The question of reducing the modifications, climatic adaptations and type adaptations is very crucial. Only by coordinating the needs for special adaptations of engines with the conditions for their operation is it possible to create the optimal service life.

A special-purpose analysis of the blocks made it possible to reveal groups of mechanisms with small (up to 500 hours), medium (500-1500 hours) and large (more than 1500 hours) amounts of annual running time.

An analysis of the technical requirements showed that for large amounts of running time it is necessary to design engines with increased efficiency factors (and this leads to increased expenditure of active materials), and that small amounts of running time are difficult for engines with short-term conditions for operation. The conclusion that was drawn promises a considerable savings on materials.

The work with the blocks for application is being continued for solving concrete problems related to the shortage of engines, improvement of the structure of the series, and their efficient operation in the branches and in individual mechanisms.

An important area of work for bringing order into the application of engines is the introduction of a procedure for coordinating their application. It was introduced in 1976 because of the low effectiveness of the utilization of engines. The most widespread mistakes of designers are the lack of correspondence of the engines in terms of capacity, startup characteristics, degree of protection, climatic adaptation, and mechanical and vibrational shock loading. When changing over from series to series, which is taking place even now, the selection of engines is frequently dictated by the conditions for maintaining the installed and adapted sizes. Here one does not take into account the fact that the capacities of the engines have increased and their operational characteristics have changed significantly. In a number of cases a violation of the supply of the national economy with industrial items takes place because of the fact that their developers have envisioned for application engines that have been removed from production or are produced in limited quantities for purely specialized purposes. This, for example, at one time led to the shortage of agricultural engines for animal husbandry. The fact is that the developers of the mechanisms began to include them in documentation for all spheres of agricultural production, including fieldwork, grain processing, shops, boilers and so forth.

Asynchronous engines comprise one of the most widespread kinds of products of interbranch multipurpose application. A shortage of them causes immense harm to the country's national economy. This was manifested especially crucially when changing over to engines with improved electrical indicators and operational specifications (series 4A). Their incorrect application and underutilization led to large unsubstantiated outlays both for the consumers and for the electrical machine builders. The introduction of the coordination of the application of asynchronous engines in newly developed and modernized facilities should increase the effectiveness of their utilization.

The coordination of the application consists in having the developers of the mechanisms monitor the correctness of the selection of engines and the correspondence of their technical specifications to the conditions for operation in the mechanism. How does this take place? Lists of questions have been developed which indicate the controlled parameters (loading diagrams, loads on the shaft of the machine, operating conditions, length of operation per year, service life, temperature, humidity and dust content, class of vibration and so forth). The developers fill these out and also the protocols and technical and economic substantiation for the selection of engines. Now the manufacturing plants will not deliver engines without the protocol number for coordination.

Each year about 2,000 protocols for coordination pass through the division for application, various consultations are issued concerning questions of the selection of an engine, and replacements with more efficient variants are suggested. The economic effect from avoiding harm amounts to about \$1 million a year and the overall effect during 1976-1983 was 8 million rubles. Moreover, there has been a sharp increase in technical discipline for the selection of engines.

All the coordinated protocols are coded and entered into the coordination blocs. The coordination blocks are good registration material. They contain complete information about the condition for operation and provide reference material for analogues of the mechanisms that are coordinated. For any given indicator any selection can be quickly taken from these blocks.

Another stage in the work is direct observation on the spot of the operation and the development of recommendations for increasing the reliability of engines. On the basis of the study of operating conditions for agricultural mechanisms a plan of measures was adopted for increasing the operational reliability of engines in agriculture. It included the development of the necessary normative documents, a system of measures for technical service and repair technology and the introduction of these into practice. The plan was signed by five involved ministries. In keeping with it recommendations were developed for selected engines for agricultural machines. They brought order into the application of agricultural, dust protection, moisture and frost-resistant and chemical-resistant engines and they increased the responsibility of the consumers for correct selection of the protection of the engines.

Research was also conducted on emergency situations. Thus in order to create a microclimate in animal husbandry complexes special heat ventilators were developed. We began to receive reports about the breakdown of engines in heat ventilators. The commissions that traveled to the Kudryashovskiy Sovkhoz in Novosibirsk Oblast and the Novobykovskiy in Vladimirov Oblast established that the engines are breaking down because they are being operated under conditions that do not correspond to the normative and technical documentation. It was suggested that the developers revise the design and the protocols of the agreement were annulled.

Another example. The textile industry is a mass consumer of electric engines. The number of engines to break down has reached 20 percent. A study of the operating conditions showed that here it is especially typical to have changing loads, the engines are turned on very frequently, and the dust content is high. Both temporary and long-range measures were developed for increasing their operational reliability. The temporary measures considered the youth of engines with higher capacities on looms and the long-range measures included the development of special engines and a rearrangement of the components of the machine tools. Some of this work has already been done. Similar research on the working conditions and operating conditions has been done for other machines in textile production.

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IMPORTANCE OF ECONOMICAL TECHNOLOGY STRESSED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 6, Jun 85 pp 108-116

[Article by F. K. Makarov, candidate of technical sciences, head technologist of the unified series of asynchronous engines of the Ministry of the Electrical Equipment Industry, All-Union Scientific Research and Planning-Technological Institute of Electrical Machine Building (Vladimir): "The Economical Nature of Technology"]

[Text] Why Is Technical Reequipment Inevitable?

Low-voltage asynchronous engines are the most widely used products in electrical machine building. Their output numbers in the millions of units a year and before the year 2000 this number will increase, being accompanied by qualitative changes in the design (1980-1990--a changeover from series 4A to series AI, 1990-1995--a changeover to a modernized AI series). It is important to emphasize that these changes will lead to a certain increase in labor-intensiveness. Thus the design decisions made for the AI series, along with improving their technical and economic indicators, simultaneously lead to an increase in the labor-intensiveness of the manufacture by an average of 15 percent. How does one fight against this? The replacement of the series should be accompanied by radical technical transformation of the enterprises which compensates for the increased labor-intensiveness of the manufacture of the engines. This process is also typical of many kinds of mass-produced products.

In our case the situation is facilitated by the fact that the time periods for the amortization of basic equipment correspond with the service life of the series of engines (in both cases--10-12 years). Additional expenditures on raising the technical level of equipment that is installed to replace amortized equipment, in spite of the rapid increase in prices (an automated line for processing the rotor shaft produced in the GDR cost 350,000 rubles in 1978 and 1.5 million rubles in 1986; a set of machine tools working together to process panels cost 920,000 rubles in 1974 and the proposed price for 1986 is 2 million rubles), these expenditures are quickly recouped as a result of the economic effect from the introduction of the new series of items into the national economy. Thus the effect for the AI series amounts to an average of 35 rubles per single engine. In a number of cases it turns out to be quite

acceptable to replace equipment which has not yet completed its service life by the time the series is to be changed.

But if one is to determine according to existing methods the effectiveness of technology based on progressive highly productive equipment, it turns out to be less advantageous than technology which is based on inexpensive universal equipment and mass application of manual labor. The fact is that in the calculations the value of the released labor force does not include expenditures on its reproduction which come from public consumption funds. Nor do they take into account the effect from the new item in the national economy. This kind of situation does not motivate planning organizations and enterprises to raise the technical level of production and serves as one of the reasons for the technological backwardness of a number of branches. Frequently progressive, costly technical equipment is forcibly imposed upon enterprises or else its utilization leads to a formal drop in the output-capital ratio. The need for the most rapid revision of methods of calculating the effectiveness of progressive equipment is obvious.

Recently a new difficulty appeared: it turned out that the underdeveloped conditions for the economic experiment which is now being conducted impede the introduction of new items. According to its conditions the enterprises should purchase new technical equipment at their own expense. But modern technical equipment is very costly. And the conditions of the experiment do not envision the possibility of large investments in equipment from the fund for the development of enterprises. We cannot search out our own funds in order to reequip our enterprises. In the longer-range future (5-7 years) we will receive this money, but this solution does not suit us. Large one-time expenditures are needed. The utilization of bank credit for these purposes involves great difficulties. The question can be resolved through forming a ministry-wide fund for development using deductions from the enterprises (similar to the formation of the unified fund for the development of science and technology).

Up to this point we have devoted most of our attention to automation and mechanization of individual processes. And the branch has achieved a good deal of success in this area and a good technological potential has been accumulated. But now another issue has been placed on the agenda--the creation of comprehensive technology, above all, mechanization and automation of auxiliary processes.

What has brought this about?

A peculiarity of the period from 1980 through 2000 is the unfavorable demographic situation and the sharp reduction of the influx of able-bodied population. An evaluation of the degree of the provision of our plants with labor resources which was conducted in conjunction with local planning organizations in specific population points and regions in which electrical machine building enterprises are located or are being planned confirms this.

Let us assume that we raise the level of mechanization of production and increase labor productivity by several percentage points. But not threefold as is now required. The necessary increase is possible only with the

availability of a unified automated system for management of production and technological processes and, on the basis of this, mechanization and automation of all auxiliary work, from the delivery of raw material to the plant to the output of the final product. Only in this case will we be able to increase labor productivity threefold, for example. What is necessary for this? The pivotal point of the entire technological process in production of engines is the transportation and warehousing complex which consists of the system of automated warehouses and conveyors of the push type with automatic designation of the destination of cargoes.

Under the conditions of socialist management there is a possibility of such concentration and specialization of production which cannot be achieved in capitalist countries. For example, large volumes (hundreds of thousands of units a year) of output of engines of one or two sizes are concentrated in several enterprises of our subbranch. This makes it possible to process parts with mass technology on automated lines. Their productivity is higher than that at similar productions in developed capitalist countries, but the labor-intensiveness of the manufacture of the parts and components is correspondingly lower. But the overall number of workers at comparable enterprises is much greater here.

Thus the Mogilev Plant of our branch produces electric engines of only one size. One Italian plant produces the same quantity of engines but of eight sizes. There are 3,500 people working in Mogilev while in the Italian plant there are only 900, although the labor-intensiveness of the manufacture of the engines is less here and the level of technical equipment higher than at the Italian plant. But about 70 percent of the people working at our enterprise are working in auxiliary jobs. Workers transport parts on carts between two high-quality automated lines, there are no mechanized comprehensive machine warehouses, and packing, marking and transferring from machine tool to machine tool are all done primarily by hand.... This is where we lose labor productivity!

We must not forget that a modern enterprise is a unified complex of machines which process initial materials and parts, components and final products, which is permeated with transportation systems which move materials, semimanufactured products and prepared products, and also systems for transferring information related to the devices so that it can be processed and administrative decisions can be made and actions can be taken. A necessary condition for normal operation of an enterprise is the availability of services that maintain both individual elements and the complex as a whole in working condition. The goal of comprehensive technology is to reduce to an economically expedient minimum the number of personnel at the enterprise (ideally--technology without human involvement). This concept essentially expands the meaning of "technology" which previously included only the processes of working with parts and components in the working organs of equipment. The large number of industrial personnel at our enterprises is a result of the noncomprehensive approach to the problem of labor productivity whereby a reduction of labor-intensiveness in the main technological divisions is not accompanied by an essential reduction of the overall number of workers. Thus the creation of fashionable individual "highly automated" and "robotized" sections, as a rule, produces no effect or might even produce a negative

effect since the number of mechanics and electricians increases without an essential reduction of the overall number of workers.

In order to produce a strategy for technical reequipment of enterprises when changing them over to new series of items we conducted a kind of functional-cost analysis (FSA) of the structure and number of industrial personnel for the various categories and kinds of work. Our typical high proportion in the overall number of industrial production personnel and engineering and technical personnel and employees (20.6 percent) and also auxiliary workers (39.1 percent) is explained by the backward methods of processing information and managing production, and also the low level of automation of control operations, mechanization of transportation and warehouse work, organization of instrument use and repair of equipment. It should be emphasized that transportation operations are indirectly involved in the labor-intensiveness of the main technological areas. Thus the actual labor expenditures on transportation and warehouse work are considerably higher. The high labor-intensiveness of assembly and coiling and insulation work is also a result of the overall low level of their mechanization and automation.

Our Goals

In keeping with the analysis we conducted, the task of an overall increase in labor productivity is being resolved in the branch through changing over to technological equipment of the next generation: automated technological complexes (ATK), automated transportation and warehousing complexes (ATSK) and integrated organizational and technical systems for management of the enterprise (ASUOT). This will make it possible to sharply reduce the number of personnel employed in transportation, loading and unloading, warehouse and monitoring operations, and also engineering and technical personnel and employees. There will also be an essential reduction in the number of workers in the main technological divisions, primarily in the coiling and insulation as well as assembly operations.

The ATK is essentially a miniplant for producing parts and components of electric engines. Production within the ATK is controlled by local systems for control of production (ASUPP) and technological processes (ASU TP). The ATK is supplied with a microcomputer which is used to provide contact with the ATSK, other ATK's and the higher hierarchical levels of the ASUOT. Thus the ATK for manufacturing the winding packet of the stator is a unified automated line in which through the transportation system and supply of robots and manipulators they combine the technological processes for insulating grooves, inserting coils, assembling circuits, binding together, impregnation and testing of the coiled stator. At the entry and exit of the ATK there is a robotized link with the automated transportation and warehouse complex. It should be emphasized that the transformation of automated lines for mechanical processing of engine parts into automated technological complexes involves only the arrangement of robotized entries and exits to the automated transportation and warehouse complex and equipping the line with a microcomputer for informational contact with the ATSK and ASUOT. And here the creation of an ATK for the production of coiled stators and an ATK for assembling electric engines constitute a principally new step in technology.

Since in a number of engines for basic use in the AI series they have used as a variant mountings made of aluminum alloys, by using an ATK for smelting them there is a sharp decrease in the labor-intensiveness and working conditions in the nonferrous metal casting shop improve. There is to be a radical technical reequipment of the iron-casting shop with extensive use of induction smelting furnaces, automated forms and automated form lines. Technical reequipment of casting production as accompanied by specialization of casting shops and concentration of the production of the same kinds of blanks.

The pivotal point of the entire technological process will be the ATSK, which consists of a system of automated warehouses and conveyors of the push type with automated designation of the cargo and robotized outlets to all ATK's and external transportation ties. The ATK's and ATSK's are joined together into a technological complex of an integrated organizational and technical system for management of the enterprise (ASUOT), which is a nonhierarchical three-level system and which solves the majority of problems related to the main and auxiliary production. Thus it reaches "from gate to gate" with the unifies system of mechanized and automated devices for the entire cargo flow of materials, parts, components and compared products. The transportation and warehouse complex is also responsible for the functions of the working organ of the ASUOT, which controls supplies of materials and semimanufactured products, the dispatch to the ATK and receipt from the ATK of processed parts and components, and the supply of them to assembly ATK's and the delivery of the final product. The productivity of all ATK's can be evenly divided among them, but they themselves are standard modules or they are assembled from standard modules. The ATSK is also formed from standard modules.

The asynchronic engine itself is essential a module construction. Within the limits of one size several dozens of individual parts and components (modules) include thousands of various uses and modifications. Within the limits of a single size the ATK is a readjusted system and thus in the AI series the production of the majority of modifications is technologically supported. But small batches of items for narrowly specialized uses are not written into the ATK. The output of parts for these items is envisioned in flexible automated technological complexes (GATK) which are controlled by the ASUOT and consist of machine tools with numerical program control or processing centers which are joined together by the transportation system and have robotized outlets to the ATSK.

The mass nature of the production makes it necessary for the ATK to be oriented toward the output of parts, components and engines within the limits of one size and, consequently, it requires further deepening of specialization of the enterprises and narrowing of the products lists. This need stands in a certain contradiction to the requirements of the market conditions which even with a planned economy are subject to fairly sharp changes. This leads to an underloading of existing capacities for a number of sizes and the overloading of capacities and the creation of a shortage of engines in other sizes. The fluctuations in the structure of the demand for items of various sizes can be covered either by maintaining reserves of specialized capacities or through flexible automated productions (GAP) which take on the "peak loads" in the fluctuations of the demand for items of various sizes and are capable of simultaneously producing parts, components and engines of several sizes. But

the productivity of the GAP will be several times lower than that of the ATK and the cost is higher. There is also a corresponding increase in the production cost and the price of the items produced in the GAP. Both possibilities require careful technical and economic comparison, on the basis of which one can make a final selection. In general the problems in utilizing the GAP are not the same. In our subbranch when the time period for obsolescence or physical wearing out of the equipment corresponds with the time period for changing the series of electric engines it is economically more advantageous to use automated lines.

Our concept is being realized in comprehensive target programs of the State Committee for Science and Technology for creating new unified series of electrical machines with alternating current for general industrial use and creating new and improving existing systems for management of industrial ministries and production associations and enterprises. The Ministry of the Electrical Equipment Industry, Ministry of the Machine Tool and Tool-Building Industry and the Ministry of Instrument Making, Control Systems and Automation have been enlisted to carry out these programs. A number of ATK's are manufactured within the framework of the CEMA: for machine processing (the GDR) and for stamping (the GDR and Czechoslovakia).

The concept of comprehensive technology is being developed and applied within the framework of the international organization Interelektro. Its implementation in the USSR will increase the overall labor productivity in the production of engines of the AI series 2.5-fold and will provide for a considerable savings on labor resources.

The concept is being realized in its full volume at the Uzhgorod Electric Engine Plant which is under construction.

How the Changeover to New Technology Is Organized

During 1981-1984 there was a certification of the technical level of the production of enterprises that produce asynchronous engines for general industrial purposes. It was based on an evaluation of the existing technological processes as compared to the technology which was based on the application of the ATK. As a result, at the enterprises certain technological divisions were put into the lowest category and a number of divisions were changed from the highest category to the first category, and only about 10 percent of them were included in the highest category. Under the conditions of the experiment, when the economic situation of the enterprises is directly related to the category of the technical level of production, this will serve as an additional stimulus for the introduction of progressive technological processes. The comprehensive target program of the USSR State Committee for Science and Technology up to the end of the 1980's envisions the manufacture and delivery of the enterprises of six head sets of ATK's, automated lines and automated installations for producing several engines of the AI series. The program also envisions the organization of series production of this equipment at enterprises of the Ministry of the Machine Tool and Tool-Building Industry and the Ministry of the Electrical Equipment Industry. By the beginning of 1985 they had already manufactured the head set of equipment for producing engines of the AI series with an axis that is 112 millimeters high for an

annual program of 225,000 units. It is being introduced at the Novokakhovskiy Electrical Machine-Building Plant.

In 1985-1990, on the basis of the concept that has been presented, technical reequipment will be carried at all enterprises for producing asynchronous engines for general industrial purposes. This process involves significant organizational and technical difficulties. The disassembly of the old and the assembly of new equipment as well as the assimilation of the output of engines of the AI series are being carried out without halting production. There are no areas for carrying out the change and the volume of output of products is the same or increasing. Practical implementation of the changeover will require efficient interaction among the institutes and enterprises of the Ministry of the Electrical Equipment Industry and associated ministries. Work on the problem as a whole is being carried out in keeping with a consolidated network schedule, on the basis of which individual network schedules are being developed for each enterprise. The associated enterprises are to provide assistance in manufacturing instruments and fittings, parts and components for the engines as well as adjusting the automated technological complexes and putting them into operation. In organizing the work they are extensively taking advantage of the experience accumulated during the 1970's by the Ministry of the Electrical Equipment Industry when changing enterprises over to the output of engines of the 4A series. True, in the 1970's this process took place under the conditions of extensive development, when the increase in the output of engines was largely provided through the construction and introduction of new capacities. Now the process of the assimilation of the new series is fraught with much greater difficulties and requires better organization of the work.

The shortage and the increased cost of raw materials and ferrous and nonferrous rolled metal has required that we apply resource-saving technologies extensively. Thus we shall use the multiseries stamp and figure cutting of belts, cross-wedge rolled metal and radical forging, obtaining synthetic iron through resmelting wastes from dynamo steel, and so forth. According to our calculations, these measures will produce a savings on rolled ferrous metals of 8-10 percent and rolled copper--5-6 percent. Recalling that the annual volumes of consumption of rolled ferrous and nonferrous metals in the branch is measured in the hundreds of thousands of tons, one must admit that this is an extremely significant amount.

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ACTIVITY OF INTERELEKTRO ORGANIZATION DESCRIBED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 6, Jun 85 pp 116-122

[Article by L. Shcherbakova: "Interelektro: Multiple Effect"]

[Text] The international organization Interelektro, which combines the interests of seven socialist countries--Bulgaria, Hungary, the GDR, Poland, Romania, the Soviet Union and Czechoslovakia--was created in 1973. Yugoslavia and Cuba entered it later. By that time the socialist countries had accumulated considerable experience in the development and production of electrical equipment products. In the Soviet Union, for example, the Ministry of the Electrical Equipment Industry changed over to the introduction of the unified competitive 4A series, which became the forerunner of the future unified series of the asynchronous engines. In Czechoslovakia they conducted in-depth research on the heat and ventilation of electric engines. Scientific research developments (NIR) in this area was also headed by Czechoslovakian designers and researchers. Yugoslavia had one of the best chambers in Europe for testing the level of noise and vibration. Therefore Yugoslavian specialists were in charge of scientific research developments on these problems. In the German Democratic Republic there were interesting results in the area of mechanical processing. It was here that they made mechanical calculations of all parts of the series. The Hungarian colleagues were in charge of the work for thermal protection of the electric engines. Specialists from Bulgaria were in charge of engines that were protected from the environment.

Consequently, the work in Interelektro is being conducted on the basis of the utilization of the advantages of international division of labor and expansion and deepening of economic and scientific-technical cooperation with voluntary observance of mutual interests.

In order to transfer scientific and technical cooperation into the practical sphere the organization must be headed by people (from each participating country) who have been given the right to make decisions on the scale of the branch regarding key principle problems. Therefore the management organ--the Interelektro Council--includes ministers of the electrical equipment industry of the countries that are included in the organization. The council is headed by V. I. Mayorets, minister of the electrical equipment industry of the USSR.

Thus we have managed to avoid having too many stages in the preparation and adoption of decisions. Between sessions of the council the organization's activity is directed by the secretariat.

Each branch of electrical equipment is represented in Interelektro by its own working group which includes representatives of all countries directly engaged in the corresponding work. Thus the third working group, which is handling the development and introduction into the production of the countries belonging to Interelektro engines of the AI series, includes from the USSR the chief of the Soyuzelektromash All-Union Production Association, A. I. Vandyshev. He is also in charge of it.

The comprehensive programs that have already been completed have been a confirmation of the organization's effectiveness. As a result of these there is series production of high-voltage asynchronous electric engines with capacities of up to 1,000 kilowatts; single-phase asynchronous engines with small capacities; foil dielectrics for multilayer printing plates; flexible electrical insulation materials based on mica paper; new kinds of lamps; highly effective sources of light; power semiconductor instruments; and high-voltage cables with plastic installation for 110-220 kilovolts.

Let us turn to the work of the third working group which is carrying out one of the comprehensive programs of Interelektro--the creation and assimilation and production of electric engines of the AI series. This program is divided into a whole number of subprograms which envision the solutions to problems in the areas of design, technology and materials. Participating in their implementation are the best representatives of international socialist scientific and technical thought. "The success of any matter," says A. K. Vandyshev, "the more so when several countries are participating in it, is determined not only by their good will, but also by their level of organization. We think that it is very important to be systematic in our work. Therefore we are reaching a point where all of the countries participating in it have particular responsibilities. The areas of the work, the agenda of meetings and their time and place are coordinated ahead of time. This disciplines the participants in the meetings and makes it possible for them to express their point of view, regardless of whether or not the country has any direct involvement in the question under discussion, and they can also register their opinion and their attitude toward the solution to the problem. The opinion of each country is not imposed or dictated, but is freely expressed and demonstrated. It sometimes happens that a decision regarding some issue is not made immediately, for example, because of a lack of information. A decision is made, as a rule, by the majority of votes, but each country can be involved in it and still hold its own opinion."

Meetings of the working group are held twice a year. Each year members of the Scientific and Technical Council for the AI Series gather. Conferences of experts are held on certain of the most essential problems, depending on the need. CEMA standards are being developed for this series. All of the scientific and technical developments are introduced into production.

"Our major task," says A. K. Vandyshev, "is to create in all the CEMA countries a scientific and technical base on which it would be possible to

organize mass large-series production of AI electric engines. It was necessary to reach a point where all of the countries had the same level of development and technology. First of all we had to study the scientific and technical problems involved in using the engines in various countries. The point of departure for planning is a unified scientific and technical base for calculations. This was important since each country had conducted calculations of electric engines according to their own methods. Through the efforts of specialists participating in the work we created unified methods for all kinds of calculations of electric engines. This was the first stage in our work. The second was the selection of unified technical specifications and GSOT's, and the third stage was using this basis to design a specific engine and, finally, the industrial output of these. Of course the work was not easy. It was necessary to make compromises. Thus in our country the cost of aluminum is lower than it is, for example, in Czechoslovakia. Therefore a compromise decision was made: we shall make the mounting for the stator of the engine from aluminum, and our Czechoslovakian colleagues will make it from corrugated steel. But the design and the indicators of the operation of the engine are the same. If the prices for metal change we shall return to this problem.

"Another advantage of producing engines of a unified series is the possibility of trading within the framework of Interelektro without coordinating technical specifications each time."

Within the framework of Interelektro each country is to produce not all types of engines, but only particular ones. Thus as a result of specialization there will be greater economic advantage for each country that is a member of the organization (see table). It will be possible to raise the technological level of production and labor productivity will increase.

On what basis is the direction for each country's specialization determined?

Each country participating in the work of Interelektro has its own production volumes, structure of production for internal needs and export, various technologies, and different capital investments in the production of electric engines. But as a result of the joint work it has been possible to overcome doubts and develop common decisions not only concerning the planning of engines, but also their production. Now each country participating in Interelektro will not be able to produce electric engines of all sizes, but will specialize in particular ones. It will deliver these to those countries which produce other sizes of engines. This kind of specialization will undoubtedly produce good results.

It is determined on the basis of the traditionally formed ties among the countries and is stipulated in bilateral agreements. Production should first of all be effective both for the entire cooperation and for each individual country. It is more economical and advantageous to produce engines of a few modifications, including from the standpoint of automation and mechanization of production processes.

**Table--Economic Calculation of AI Series (Annual Savings
for Countries Participating in Interelektro)**

Страны (1)	Производство в 1985 г., тыс. шт. (2)	Экономия электроэнер- гии, МВт·ч (3)	(4) Экономия материалов			Экономия от снижения уровня шума на 5 дБ, тыс. руб. (8)	Экономия от повышения на- дежности с 0.9 до 0.95 за 10 тыс. часов работы тыс. руб. (9)
			сталь электро- техническая, т (5)	медь электро- техническая, т (6)	железо, т (7)		
(10) НРБ	1 470	22 500	1 790	120	3 360	2 350	3 980
(11) ВНР	700	27 000	13 000	120	460	818	1 130
(12) ДР	1 960	51 600	860	40	—	—	—
(13) ПНР	2 910	153 700	5 935	273	—	3 600	4 990
(14) СССР	12 160	290 000	12 700	1670	49 470	15 560	20 850
(15) ЧССР	3 790	113 000	5 150	150	6 725	3 268	4 304
(16) СФРЮ	1 970	295 000	—	—	—	2 700	4 170
(17) Всего:	23 040	952 800	27 735	1827	60 015	28 296	39 923

Key:

1. Countries
2. Production in 1985, thousands of units
3. Savings on electric energy, megawatt hours
4. Savings on materials
5. Electrical steel, tons
6. Coiling wire, tons
7. Iron, tons
8. Savings from reducing noise level by 5 decibels, thousands of rubles
9. Savings from increasing reliability from 0.9 to 0.95 for 10,000 hours of operation, thousands of rubles
10. Bulgaria
11. Hungary
12. GDR
13. Poland
14. USSR
15. Czechoslovakia
16. Yugoslavia
17. Total:

Of course many problems go beyond the framework of Interelektro and can be resolved at the level of other departments. In our country we have the USSR Gosplan, Gossnab and the Ministry of Foreign Trade. They include, for example, exporting products to third countries. For each country included Interelektro has its own commitments and its own traditional ties.

And it is possible to find a solution to this problem that is acceptable for all. As a rule, under agreements on a bilateral basis states included in Interelektro give one another permission for other exports.

The introduction of a jointly developed electric engine into production, as practice shows, does not take place without difficulties.

Here is what A. K. Vandyshev says: "The greatest economic effect from the introduction of the AI series can be achieved with the most rapid possible changeover of a large mass of enterprises to producing this series. The scope and rates are important economic trump cards. But the introduction of the AI series is proceeding under the conditions of specific production. And here we are held back by several aspects. First and foremost we cannot replace the basic capital of the plants and combines or associations until the time period for their amortization has expired. As a rule, this is costly equipment (up to 200 million rubles). There have been difficulties in evaluating the level of technology. The level of technology varies at enterprises of various countries. Certain countries which produce a small quantity of engines but of many types are using flexible restructured lines. In the same countries, in places where the volume of output of electric engines is more significant, they use more 'rigid' lines.

"Then there are difficulties with insulating materials (in practically every country the chemical industry is unable to satisfy the needs of electrical equipment manufacture).

"Each country participating in Interelektro has its own system of planning and foreign trade. For example, in Czechoslovakia large concerns solve all problems of exports, while in our country the USSR Gosplan, the USSR Gosstnab and the Ministry of Foreign Trade handle this."

But in spite of these difficulties Interelektro is continuing its work. The organization is capable of satisfying the needs for asynchronous engines of each country through production in the countries of socialism. This is especially important today when relations with capitalist countries are so unstable.

Cooperation along the lines of Interelektro takes place on many planes. In addition to scientific and technical ties and contacts along the lines of managers of associations (the Soyuzelektromash All-Union Production Association with concerns and combines of other socialist countries), there are close ties at the level of the enterprises. They are arranging their interrelations on the basis of the study of each other's experience and economic interconnections. The experience of the friends is studied by the managers of enterprises, designers, engineering and technical personnel and workers. As a result of these trips to other plants friendly contacts become deeper and there is an exchange of experience in improving technology and organizing production and work stations.

The success of the program for the development and introduction of asynchronous electric engines is obvious. But this does not mean that the subject is closed. The next stage is improvement of electric engines. This is the main direction for the third working group over the future five-year plan.

There are also broad possibilities of improving the activity of Interelektro. Thus within its framework under unified programs and a network schedule several working groups can operate. More and more attention is being paid to bilateral ties. A. K. Vandyshev says:

"We are now considering the possibility of organizing the Soviet-Czechoslovakian economic association (SChKhO). The expediency of its creation has been confirmed by both sides. Its structure and charter are being developed. This will be a joint firm which serves specialized productions in these countries and coordinates the volume of deliveries between the two countries over a 5-10-year period. Since it is planned to ship millions of electric engines, questions of transportation become very important. The SChKhO should apparently have its own warehouse complexes since it will be handling the delivery of the products to the consumer."

And how do the creators of the new technical equipment, the designers, operate within the framework of this organization?

V. I. Radin, the head designer of the AI series of electric engines in our country says: "One must say that the joint work of specialists of this rank is very interesting and useful for everyone who participates in it. Frequently the effect of the developments is multiplied because of something like a simple selection of the most efficient technological and design devices which are used in the various countries. Thus in Hungary, for example, they traditionally fasten bolts differently from the way we do. It turned out that their way is more efficient. It is through this kind of trivia that we have managed to reduce the weight of the design part of the electric engine--the body, the panels and the shaft--by 25 percent. By taking advantage of the positioning of the ribs of electric engines that is used in Czechoslovakia we saved 20 percent of the iron. The temperature of the engine was reduced by 15 percent as compared to the 4A series because of efficient selection of ventilators, the casing and so forth. This kind of joint work is extremely useful. Everyone felt this and participated in it with great interest."

And so the effect of Interelektro lies not simply in the merging of the potentials of the socialist countries. Its effect is a multiple effect.

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USACHEVA ARTICLE DISCUSSION REPORTED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 6, Jun 85 pp 123-144

[Article on the results of the discussion of the article by I. I. Usacheva "The Economic Service of the Enterprise and the Management Mechanism": "Organizers of Economic Progress"]

[Text] What Authority Depends On

I should like to begin our concluding discussion about the economic services of enterprises and associations¹ with a letter to the editorial staff from the head of the department of economics of industry of the Izhevsk Mechanics Institute, V. A. Filippov. "It was with deep satisfaction that I read in your magazine the series of articles about the experience of the Sumy Machine-Building Association imeni M. V. Frunze,"² he writes. "Perhaps the only report that has given me more satisfaction was the one in the magazine KOMMUNIST concerning the fact that this experience has become a part of an experimental GOST on management and is being introduced at 300 support enterprises of 27 industrial ministries."³

"When creating and realizing their economic-organizational innovations the Sumy machine builders, in addition to progressive systems of management, create (in the best sense of this word) the most profound change in the minds of people and they create that psychological and moral atmosphere on which, essentially, a successful solution to economic problems depends. For when drawing up the difficult plans on the basis of complete utilization of production capacities according to the methods of the Sumy Association, with the system of accounting and analysis of the idle time of equipment that is in effect here, all reserves are plain to see. And it becomes very important to reveal them when the material and moral incentive are arranged on the basis of an evaluation of the most complete utilization of the potential at the disposal of the production subdivisions!

"In order to create and realize these management methods the manager must take on responsibilities that go beyond the framework of what is usual, what is 'assumed.' This is within the power of efficient managers, those who think broadly, are bold and energetic. Included among such managers, undoubtedly,

is the deputy director for economics of the Sumy Machine-Building Association, doctor of economic sciences V. P. Moskalenko."

It seems to us that this letter convincingly answers the question of what the authority of the economic service and its manager depend on. Does this service try to actively influence all of the production and economic activity or does it occupy the modest position of a compiler and distributor of plans and resources, a registrar, an accountant and a monitor of expenditures and results that are achieved--this is what largely determines its position and role in the system of the management of the enterprise or association.

Many participants in the discussion think that the difficulties in the work of the economic services are related to the lack of a particular legal status and organizational structure. "My own work experience as head economist has convinced me that the possibilities of this position are extremely dispersed and primarily because the individuals who occupy it do not have any particular authority and are clearly constrained to a range of duties," writes economist G. G. Dubich from Zaporozhye.

There is no doubt that a good deal is determined by the conditions of the activity of the economic services. But is everything? Let us take the ZIL Production Association--16 enterprises from Zhitomir to Chita, and not one of them has been left with independent books. This is a unified production organism in spite of the distance and difficulties involved in feedback: it has one bank account, one set of books and no repeat accounting. The interrelations among the enterprises within the association are regulated on the basis of cost accounting and well-developed procedures for planning, accounting and control. The economic mechanism created under the leadership of the deputy general director for economics, Aleksandr Ivanovich Buzhinskiy, functions efficiently and without interruptions.

The authority and significance of the ZIL economic service is high because it is a true management service. It organizes and controls cost-accounting activity, economically evaluates technical equipment that is developed and, consequently determines the expediency of its creation. The technical managers not only recognize this right for it, but they themselves try to have the service judge their decisions and look for its support because they have repeatedly been convinced that its calculations are correct and its suggestions are useful. Yet the interaction between the economic and technical services frequently presents a problem that is difficult to solve. At the round-table meeting on the subject of our discussion Dr of Technical Sciences V. I. Radin, the head designer for asynchronous electric engines, expressed fairly definitely his skeptical attitude toward the economic service: "I have been working at the Plant imeni Vladimir Ilich for 33 years. During this time our economic service has expanded geometrically if not more, but the efficiency factor, it seems to me, has decreased."

Skepticism and the difficulty of mutual understanding can be overcome if the level of economic work is high. In the Odessa Kislodromash Scientific Production Association, just as in other scientific production associations, the enterprise and the institute do not have a unified plan, wage funds or material incentive funds. Nonetheless the economic service of the Scientific

Production Association does not let the reins of control out of its own hands. Methodological provisions are created for planning and incentive which bring together as much as possible the interests of science and production, and compulsory technical and economic expert evaluation of new items is introduced at all stages of planning and production, as a result of which the undesirable tendencies and the deviations from the planned level of expenditures are revealed on the spot.

One does not wait for rights and authority, one wins them! This is shown by the experience of the economic services of ZIL, Kislodromash, the Sumy Association imeni M. V. Frunze and other leading enterprises. But this in no way contradicts the suggestions of the readers concerning improving the organizational structure and methods of operation of economic services.

Is a Single-Type Structure Necessary?

"In 1963 I had occasion to participate and speak at an all-union conference of head economists which took place in Sverdlovsk," writes the economist V. I. Lopatik from Leningrad. "Many correct ideas were expressed there concerning the rights and responsibilities of the head economist as the individual who is fully responsible for the organization and condition of economic work at the enterprise. More than 20 years have already passed since this conference, but the questions of organization and management of the economies of enterprises have still not been resolved."

Yes, that is true. Even within the framework of the single branch the picture seems fairly varied: a lack of coordination in the composition of the divisions that are included in the economic service and a dispersion of functions. At certain enterprises the manager of the economic service is left in the role of a colonel with only a staff but no army--just a laboratory and a division for economic analysis. Neither the planning and economics division nor the division for labor and wages is under his jurisdiction, not to mention the ASU division which finances the service. This happens especially frequently in places where they have introduced the position of a head economist, but not that of a deputy director for economics.

At the level of many branches and subbranches there are no individuals responsible for the coordination of the economic work of enterprises and associations. Frequently when he arrives at the ministry or VPO, the deputy director for economics does not know which door to knock on in order to solve some particular problem. He has to knock on them all, one at a time. The problem breaks down into a multitude of small questions and subquestions, and nobody to whom the economist turns for help can see the problem as a whole. With certain individuals one coordinates staffs and wage funds, with others--planning indicators, and with still others--material resources. It is extremely difficult to join them all together later.

V. K. Bersenev, the chief of the planning and economics division of Uralruda Association emphasizes: "With a developed industrial potential and complex interrelations among enterprises and branches it is necessary to coordinate economic activity at all levels of management. This work can be carried out by a high official who has been given great rights and responsibility in the

area of the functions and trust to him--the first deputy director for economic work, the first deputy chief of the VPO or the minister."

We support the proposal from the readers to concentrate economic work at the level of the branch and the subbranch in the hands of particular individuals who have been given high authority. Obviously in the country's economic staff as well--the Gosplan--we should have a subdivision which would engage in problems of the organization of economic work at the enterprises.

Another extremely center around which it would be possible to concentrate scientific and methodological work for improving the economic activity of the enterprises is the All-Union Scientific Economics Society (NEO). The NEO is hardly operating correctly when it is enclosed within planning, financial and supply agencies or their scientific research institutes and does not have as its goal to influence the enterprise. This opinion was expressed by readers of the magazine in questionnaires when they were evaluating the seventh issue of the magazine for 1983 in which it published materials on the NEO. They write that in many cities and republics the role of the NEO in economic life is either very weak or is not felt at all. The readers think that the scientific economic society should coordinate the dissemination of advanced economic experience in the country and help to introduce it at enterprises and associations. The editorial staff supports this point of view.

What should be the structure of the economic services? It is difficult to agree with those participants in the discussion who think that it is necessary to establish a single type of structure for all enterprises and associations, regardless of the branch to which they belong.

"When looking over the materials from the round table devoted to problems of the work of economic services,⁵ I was surprised and confused to read that at ZIL and VAZ the legal divisions are included in the block of economic services and correspondingly are under the jurisdiction of the deputy general directors for economics," writes the chief of the legal service of the Leningrad Vibrator Production Association, V. I. Chudnov, honored lawyer of the RSFSR. "This confusion will be understandable if one takes into account that according to the provisions concerning the legal service it is directly under the jurisdiction of the enterprise manager. And the chief of the legal service is appointed to the position and fired from it by the higher organization. And this is understandable, for the legal service is called upon, on behalf of the state, to ensure observance of socialist law and state discipline in economic activity.

"There is no doubt that economics and law are now perceived as parts of the unified whole, but this certainly does not require that the legal service be directly under the jurisdiction of the deputy director for economics. One can speak about interaction and joint participation, but not jurisdiction."

But it is precisely for interaction at the ZIL that the contract and legal division is included in the block of economic services. To increase the amount of attention paid to carrying out deliveries under contracts and complaint work--this is the purpose of transferring the contract and legal division to the block of the economic service. The advantage has turned out

to be mutual. The legal experts have a deeper knowledge of the problems of production and the economists know more about economic law.

At the ATE-1 Plant one of the legal groups that is administratively under the jurisdiction of the chief of the legal division performs contractual and legal functions as part of the sales division, in which all work with the consumers is concentrated--from concluding agreements and checking on the filling of orders to the dispatch of the products. This concentration of functions contributes to complete carrying out of deliveries according to orders and contracts.

The specific nature of production and the peculiarities of the enterprises dictate and will dictate their own conditions for economic work. But one can and should develop a unified methodological basis for the functioning of economic services, determine the range of their tasks and responsibilities and develop variants of services with respect to various types of enterprises and associations. Here, it seems to us, the decisive word should go to the Gosplan and its scientific research institutes.

Attention should also be given to the suggestion of the head economist of the Dneproshina Association, B. I. Minevich, to prepare and discuss at a conference of the leading scholars and industrial economists drafts of programs, methods and the legal status of economic services and a model organizational structure.

To be organizers of economic progress--such is the responsible mission of economic services under the conditions of intensification of public production. "The greater the requirements on the effectiveness of production, the more persistently the question of its intensification is raised, the more complicated the task of economic services will be," writes the honored economist of the RSFSR from Novosibirsk, G. R. Fridman. "When one enterprise is working steadily, providing for fulfillment of the plan with respect to all indicators, these victories are attributed first of all to the management, the technical services and the public organizations, and the economists are the last to be remembered. But as soon as the production becomes a little "shaky" all of the problems are blamed on the economists, and the responsibility of the other services recedes to the background. Here one can see quite definitely that the role of the economists is not so small."

V. T. Serov, an economist from the city of Andropov in Yaroslav Oblast, emphasizes that "the economic service exerts a decisive influence on production through the organization of cost accounting. Through this it provides for a reduction of the expenditure of resources for each unit of product that is created. This is important for the society as a whole, but, unfortunately, it does not always correspond to the interests of individual people and economic managers. To organize the work of the economic service in such a way that its major efforts are concentrated on cost accounting is difficult but necessary. We are now investing too many forces in investing funds and limits in the higher organizations and distributing them among the subdivisions among the enterprise as well as substantiating adjustments to the plan. This distracts us from our major business--increasing production effectiveness."

The time has now come when the issues in the foreground are not those of quantitative growth, but issues of effectiveness and quality. It is quite understandable that the role of the economic services and the requirements placed on them are increasing. Of course, a good deal is determined by the conditions for their activity: how is the plan provided with resources, how is it balanced with capacities, how is technical progress developing. But the economists have at their disposal an immense arsenal of means with which they will be able to actively influence the effectiveness of production. These include intraplant cost accounting, methods of evaluating technical innovations, incentives according to the final results of activity, the organization of the brigade contract, and so forth. It is important to utilize these immense opportunities skillfully.

Inspection for Durability

The role of the economic services is increasing even more because of the large-scale experiment in expanding the activity and increasing the responsibility of enterprises and associations for the final results of their work. They are responsible for the degree to which the new principles of management are reflected in intraplant cost accounting, in the provisions concerning material incentive and in the conditions for socialist competition.

All the direct and reverse communications from each participant in the experiment to the upper stages of branch management will pass through the economic staff of the enterprise. They have a complicated and responsible mission which requires, on the one hand, persistence in defending progressive economic decisions and, on the other, speed of reactions and flexibility when it appears that certain innovations are not working, that they are not taking hold.

The realization of large economic innovations rarely comes without conflicts since they involve the interests of individual workers and entire collectives much more than technical innovations do. Many problems and difficult situations are also being revealed during the course of the experiment. Here is one of the typical problems which actually arises. The experiment envisions 15 percent additional deductions into the material incentive fund (FMP) for 100 percent fulfillment of the delivery plan. A fairly significant increment. In the branches that are participating in the experiment, since the beginning of 1985 there has been a sharp increase in the number of enterprises that are completely fulfilling contractual commitments. Understandably, a certain role was played by the approval of the technical and industrial financial plans earlier than usual, which improved their balance with the resources somewhat, as did the rights granted to production managers to utilize the wage and material incentive funds. But another thing also became clear. Certain enterprises, in order to make their lives easier in the first quarter, agreed with the consumers to postpone the dates of the delivery of individual items to subsequent months. The start was successful and the bonuses were received, but the end of the year turned out to be bad.

Or here is a fairly typical situation. Some of the managers were attracted by the possibility of creating reserves of raw and processed materials. For orders were rushed through in the Gosstab agencies (a participant in the experiment!) and were the first to be filled. Thus the above-normative supplies in the warehouses of certain enterprises increased.

The departments and branches, from their end, violated the purity of the experiment by being late in issuing normative documents and instructions. Even the set of instructions concerning the policy for planning--one of the fundamental ones--arrived late. Enterprises of the Ministry of the Electrical Equipment Industry did not receive them until the first quarter of 1984 when the experiment was already in full swing. There was intervention into the rights and independent actions of the associations and enterprises which was not envisioned in the plan. In particular, they established limits on the number of personnel for reducing the administrative and management staff. They did not eliminate the imbalance in the plan in terms of volume and physical indicators.

It is with great difficulty that enterprises participating in the experiment manage to use the fund for the development of production, although the methods for its formation have been significantly improved. When the proportion of profit is increased it increases appreciably, and now all of it remains at the disposal of industry--no one has the right to encroach upon. The fund for the development of production can be accumulated through subsequent years if it is not fully utilized. Having considerable amounts of money at its disposal, the enterprise can independently carry out large work projects for reconstruction and technical reequipment. But how does it acquire the materials and equipment? For, as usual, when assigning limits preference is given to new construction through centralized capital investments.

It is quite predictable that the experiment has caused many problems. The reason it is being conducted is to test new methods of management and realistically evaluate their merits and shortcomings. But under these conditions a good deal depends on the economic services. Being in the middle of events they are undergoing a kind of test for endurance. If they fail to notice unsuccessful decisions and let them pass, if they do not notify the higher levels promptly and if they do not improve their own methods and provisions, then subsequently these shortcomings of the economic mechanism can impede efficient management. Therefore they do not have the right to remain passive observers. They must take an active position.

"A Burden for Two"

Although the main organizer of the realization of economic innovations at the enterprise should be the deputy director for economics, one cannot denigrate the role of the top manager of the enterprise. As was very pointedly noted by the economist V. T. Serov (Andropov), improvement of the economic mechanism at the enterprise is always a "burden for two."

How does one distribute this "burden for two" so that it is not too burdensome and so that each party bearing it will feel the support of the other? Many of those who wrote responses correctly think that the effectiveness of the

interaction of the team "director--head economist" (deputy director for economics) depends on the top manager. Far from all economic leaders have a feeling for economics and therefore there are many enterprises where the position of deputy director for economics is filled by people who have nothing to do with economics either by their education or by the nature of their previous activity. Even on the staffs of such a leading association as Estonslanets we have encountered many managers of economic services like the ones described by the association's chief of the division for analysis of production and economic activity, A. K. Semenov.⁶

But the majority of directors are far from indifferent to the person who stands next to them on the command bridge. Their opinion was expressed by the general director of the Ob Association, candidate of economic sciences S. M. Zverev: "The manager of the economic service must be professionally trained to make competent decisions in the area of production and he must master methods of economic analysis and prognostication as well as economic-mathematical methods. Then he will be able, on a par with the director, to bear full responsibility for the economic condition of the enterprise.... But light industry enterprises receive few specialists who are prepared for carrying out these tasks. Hence the dissatisfaction of the managers with the level of economic work and the immense unutilized internal reserve. Hence also, it seems, the frequent allusion of the economists to the fact that the enterprise manager does not support them and makes decisions without taking their opinion into account."⁷

Of course Stanislav Matveyevich Zverev is going on his own experience and sense of the world, on his attitude toward the problems of economics and management in which he displays an immense amount of interest. Like the majority of directors, he has had a basic specialized education as an engineering technologist in light industry. After he was already the manager of the association he took a course in the special department for managers at Novosibirsk State University. His project upon completing the course was the basis for the dissertation which Zverev devoted to improving the management of light industry enterprises.

Such a phenomenon is no longer an exception. Many managers who take training in the Institute of Management or Academy of the National Economy or in branch institutes for increasing qualifications subsequently continue to study economic problems in depth and receive scholarly degrees.

We share the viewpoint expressed by the reader from Zaporozhye, G. G. Dubich: "Only motivation and high responsibility on the part of the top manager can put everything in its proper place. But he too, the top manager, must be in his place. And this is possible with mainly economic, and not administrative methods of management. Then the actual main thing will be the question of the effectiveness of production, and after this great significance will be attached to methods of planning and accounting for expenditures on the basis of scientifically substantiated normatives and cost accounting will become more deeply ingrained. And questions of the position of the economic service will immediately fade away. The director himself will not be able to do without it."

This conclusion is corroborated by the increased attention paid to economic work by directors of enterprises participating in the experiment. Today they have to delve into all the fine points of economic mechanism for management and they will undoubtedly be interested in having this burden shared by competent deputies for economics who have initiative.

The Queen in Cinderella's Dress

The effectiveness of economic work depends largely on the level of organization of accounting. Planning and accounting are an inseparable whole. This truth is indisputable and nobody has any doubt about it. It is impossible to have an improved system of intraproduction cost accounting if it is not based on well-arranged accounting. The instructions of V. I. Lenin⁸ concerning the need for "comprehensive statewide accounting and control" remains crucial to this day. Existing cases of write-ups, appropriation of state property and theft are a direct consequence of weak accounting and control in production. Facts and proof of this are given to us in the press regularly.

In their responses readers express alarm about the fact that at many enterprises the "mirror of accounting is growing dull," as candidate of economic sciences G. V. Yemuranov⁹ put it, and they relate this to the reduction of the role and authority of bookkeeping services and of the prestige of the profession of bookkeeper.

And yet economic work began 500 years ago, recalls Candidate of Economic Sciences G. P. Bigzava (Tbilisi) with the creation by the Italian mathematician Luca Pacelli of a system of bookkeeping entry of economic operations which up to this day is the basis for the technology of bookkeeping. Goethe called this system one of the most eloquent inventions of the human spirit.

G. V. Yemuranov thinks that the authority of the head bookkeeper has decreased significantly because of the introduction at enterprises of the position of deputy director for economics. "While previously there was a direct tie between the director and the head bookkeeper, today there has appeared a new unit which speaks on behalf of the head bookkeeper," he writes.

The opposite opinion is held by the head economist of Dneproshina, B. I. Minevich: "The separation from the bookkeeping services of the planning-economics, financial and other divisions during the 1930's as the national economy developed was a predictable phenomenon. But in its activity bookkeeping cannot be separated from other economic subdivisions just as it cannot be dissociated from the functions of analysis of economic activity. And therefore bookkeeping should operate in cooperation with other economic subdivisions."

Candidate of Economic Sciences G. V. Grenbek (Novosibirsk), responding to the article of I. I. Usacheva, emphasized that "economic analysis of the operation of the enterprise in terms of the results of each month, quarter and year was at one time the core of the activity of the head bookkeeper and his immediate assistants who were responsible for the main areas of production expenditures.

Sanctions of the head bookkeeper for one expenditure or another were given primarily out of considerations of whether or not they were "necessary," "useful," or "important" (under the condition, of course, that the given operation was legal). And the head bookkeeper of the enterprise was the head economist not in terms of his job title, but in the essence of the matter.... Now the head bookkeeper signs documents or does sign them mainly out of considerations of whether "it is permitted" or "it is not permitted." Going over in his mind the multitude of instructions, normative documents and guidelines from previous inspections. Economic expediency has receded to the background and it might not always even be in his realm of competence.¹⁰

In terms of his established position the head bookkeeper is directly under the jurisdiction of the top manager of the enterprise or association. But there is no doubt that there should be no barrier between the economic subdivisions and the bookkeeping service. We agree with the viewpoint of V. I. Lopatik (Leningrad), B. I. Minevich (Dnepropetrovsk), G. G. Dubich (Zaporozhye), A. I. Buzhinskiy (Moscow) and many other readers who think that in order to ensure unity in the methods of planning, accounting and analysis, it would be expedient for the bookkeeping service to operate under the methodological guidance of the deputy director for economics.

The effectiveness of bookkeeping depends on the qualifications of the workers who carry it out. Yet its level is rising much more slowly than the requirements that are being placed on it. In the bookkeeping services there are considerably fewer specialists with a higher education than in other economic subdivisions.

The lack of prestige of the bookkeeping occupations is related to the great labor-intensiveness and monotony of the work, on the one hand, and the increased responsibility, on the other. Moreover the level of wages here is also lower than in other economic subdivisions and the reduction of the number of administrative and management personnel affects bookkeeping workers more frequently than it does others.

But the number of staff units are being reduced and specialists are needed, the more so since the volume of accounting and reporting data is increasing along with the complication of production and the increase in its scale. Therefore managers of enterprises are not actually reducing the sizes of their staff. People, while continuing to do their own job, are included on the staff lists of other enterprises in the positions of engineers and workers "with all the ensuing job confusion and distortions which give rise to job irresponsibility."

The head bookkeeper of the Solnechnogorsk Machine Plant (Moscow Oblast), I. P. Naumov, raises the question in the following way: "It seems that something is not right here--in the first place they reduce the number of people who keep accounts and protect socialist property.... The occupation of a bookkeeper since ancient times has been the best occupation for an honorable and strong man. But today representatives of the stronger sex have almost disappeared here: 92 percent of the accounting workers are women, and they also comprise 75 percent of the head bookkeepers at enterprises and organizations."¹²

But even though higher educational institutions are not training enough bookkeepers and even though some of the bookkeeping workers are leaving their profession and changing over to other economic subdivisions, in some economics departments and economic VUZ's they are closing down the bookkeeping specialization (for example, at Georgia State University, as Candidate of Economic Sciences G. P. Bigzava states). These are strange and alarming actions to say the least.

Improving methods of accounting and control and increasing the role of the bookkeeping service constitute a crucial problem. Improvement of the economic mechanism as a whole will also depend on its solution. This is one of the conclusions from our discussion.

Increasing the Prestige of Economic Professions

The facts show that prestige is dropping not only in bookkeeping, but also in other economic professions. This was noted by almost all participants in the discussion. The majority of positions in economic services are for administrative and management personnel, and the Damocles sword of cutbacks is constantly hanging over their head just as it is over bookkeeping workers. The salaries are not high and the prospects for advancement are less than in the technical services. Various subdivisions of economic services are evaluated in various ways. "Why are economists of the planning division included with engineering and technical personnel while those of the financial division are employees? We do similar work and the load is just as great both in terms of volume and in terms of significance, and the evaluation of the labor, in our opinion, should be the same," write workers of the financial division of the Gorkiy Aircraft Plant. One cannot help but agree with them!

"Regular cutbacks of administrative and management personnel have led to a situation where many enterprises no longer have analytical subdivisions. The staffs of economists now can perform only operational, current work," writes R. Kh. Tukhvatullin. "The average wages of economists taking bonuses into account are almost 30 percent lower than those of engineering and technical personnel. Engineering and technical personnel can receive bonuses for new technical equipment, efficiency proposals and inventions, economizing on resources and the basic indicators of production and economic activity. But the economist is given incentives mainly only for the results of production and economy activity. And why not give incentives to those who develop progressive normatives for expenditures on production? In many cases this is no less important than obtaining the actual savings since the normatives provide a system of economic management. And the moral incentives also give evidence that economists are in secondary roles. Underestimation of economic services is a clear underestimation of economic activity."

"I read somewhere that the famous brigade leader V. P. Serikov included an economist in his cost-accounting brigade, and we are trying to get rid of him--after all he is one of the administrative and management personnel" (R. Ya. Beresneva, deputy director for economics of the Kharkov plan for medical plastics and stomatological materials).¹³

A well-known brigade leader who was the first to open the way for the collective contract in industrial construction, V. P. Serikov actually does value highly the role of the economist and thinks that without economic evaluation any economic initiative is doomed to failure. At the All-Union Scientific and Practical Conference on Problems of the Economy of Developed Socialism held in December 1983, he said the following: "In the second position after the minister one should place the deputy for economics, and after the chief of the VPO as well. And the same thing should be true at all levels of management of production.

"In our brigade the economist has become the second in charge after the brigade leader. Without him we could not organize the cost of accounting in an economically intelligent way, or analyze and substantiate the inclusion of various points in the contractual agreement between the brigade and the administration. When we concluded the agreement certain management workers thought we were crazy. The procedure for discussing and signing the document lasted for about 10 days. And those brigades which hastily signed the agreement were equally quick to become embittered and disenchanted, since many unforeseen situations arose in their work. But if we have concluded an agreement we fulfill all of its points."

Another important aspect of increasing the prestige of economic professions is strengthening the creative basis in the work. Practice and scientific research show that now accounting and reporting operations comprise the main content of the activity of economic services.

Operational affairs, filling out various kinds of inquiries, reports and forms, push into the background analytical activity and the development of the long-range directions for management. Using the results of an investigation of economic services of 13 machine-building plants in Belorussia, candidate of economic sciences A. V. Sosnov shows that the proportion of long-range activity comprises only 8-10 percent of the working time of economic subdivisions.¹⁴

But even under these conditions, writes economist V. F. Buzik from Leningrad, the pressure of ideas in the sphere of economics is not weakening. "Now, on the basis of the existing "Revisions Concerning Discoveries, Inventions and Efficiency Proposals," the policy is regulated for considering and awarding authorship, as is the policy for utilizing research and development that make radical changes in the level of awareness. These provisions do not extend to economic science," he recalls. "Under these conditions the economist has nowhere to go with his long and sometimes tormenting thoughts and ideas. The provisions have turned out to be especially useless when it comes to large ideas and innovations which affect the entire national economy and its large spheres.

"But the authors of new ideas are not stopped by the fact that, as a rule, the old is being defended with increased vigor. They do not think about establishing their authorship or obtaining moral and material incentives. Their main goal is to avoid the shocks and tremors that are caused to production by the inadequate economic mechanism. It is necessary to support and encourage them."

There is no doubt that V. F. Buzik is right. Incentives for creative research in the organizational and economic sphere should be reflected in the legal norms concerning efficiency activity. Can it really be, for example, that such an organizational-economic innovation as the brigade method, its Kaluga variant, the Shchekino method and other innovations are not efficiency ideas of national economic significance?

In order for economists to be able to concentrate their efforts on the functions of analysis, the prospects for development and improvement of the economic mechanism, they should be relieved of current business. The avalanche of accounting and reports documents is snowballing. "In spite of certain instructions which prohibit demanding from the enterprises certain information except for statistical reporting and those which prohibit the enterprise from giving this information, the flow of this information is not decreasing but is increasing without restraint" (L. A. Feldbeyn, head economist of the Frunze Plant for Agricultural Machine Building).¹⁵

"Life has shown that the volume and system of indicators of state reporting provides the necessary information for administrative agencies of all levels. Superfluous, illegal reporting is burdensome. During 1981-1982 alone this was found in dozens of ministries and departments. It was necessary to abolish 2,500 report forms which contain a million and a half indicators. This is about half of the overall volume approved by the USSR Central Statistical Administration," wrote the chief of the country's Central Statistical Administration, L. M. Voldarskiy, in PRAVDA.¹⁶

As soon as the enterprise enters the area of experimenting for improving methods of management and administration the flood of information overflows its banks, just as a river does during a flood. The large-scale experiment is no exception. It is a directly paradoxical situation: the number of indicators approved from above decreases, but the volume of reports increases. Local management agencies require information for all indicators which existed previously because they are used to deal with the other enterprises which are not participating in the experiment and without them it would be impossible to sum up the results of socialist competition. The ministry also "displays curiosity" regarding all of the previous indicators.

It has been suggested that economists will be relieved of routine work to a considerable degree because of computer equipment and automated systems for control of the enterprise. But practice has not produced the expected result. And the creation of branch ASU's (OASU) have even added manual work because of the lack of correspondence between the forms on which the information is submitted and the plant forms.

"The volumes of work in economic services are increasing but the staffs are not increasing. And this is quite correct since it is necessary to automate the work and free up the time of the economists by eliminating elementary calculation operations which do not require the qualifications of a diplomaed specialist," writes the young economist S. Gorbatenko from Sverdlovsk, a graduate of the engineering and economics department of the Ural Polytechnical Institute. He suggests creating automated work stations for specialists of an

economic profile (ARM) similar to the ARM's of the developers of design and technology which are equipped with personal computers, monitors and other organizational and technical means.

"The Economist Should Look in the Direction of Technical Progress"

This instruction from Lenin has become a hundred times more crucial in the age of the scientific and technical revolution. Today we need economists who are familiar with computer equipment and automated control systems and who are capable of figuring out modern technologies and machines as well as organizing planning and management under the conditions of flexible production complexes and the latest technological systems. The training programs of the VUZ's do not always keep up with the rates of the scientific and technical revolution. The equipment of the VUZ laboratories and workshops does not always make it possible to familiarize the students with the most modern achievements of scientific and technical progress. Many readers point to the fact that student practice at large modern enterprises should contribute to improving the training of future economists in problems of the economics of scientific and technical progress.

Attention should be given to the suggestion of Prof L. A. Konovalov and Candidate of Economic Sciences A. B. Grebenkin from Sverdlovsk concerning the formation of training and production complexes part of the economics departments of VUZ's, the economics services of plants and scientific research institutes of an economics profile.¹⁷ The Sverdlovsk workers have experience in this kind of cooperation between the Ural Polytechnical Institute--Uralsmash and the Scientific Research Institute of Economics and Planning of the USSR Ministry of Heavy Machine Building; in Novosibirsk--the Economics Department of the Novosibirsk State University and the Institute of Economics and Organization of Industrial Production of the Siberian Branch of the USSR Academy of Sciences and the Berdskiy Radio Plant; in Donetsk--the economics departments of the university, the Institute of Economics of Industry of the Ukrainian SSR Academy of Sciences and enterprises of Donetsk. Here, incidentally, on the initiative of the Institute of Economics of Industry a department of economic law was created. The specialists are especially needed under the conditions in which economic ties have become more complicated and more attention is being paid to the fulfillment of contractual commitments.

The enterprises are experiencing a critical need for specialists in socioeconomic problems of labor and industrial psychology. From year to year their orders for sociologists and specialists in norm setting go unfilled. In departments of labor and wages, scientific organization of labor and sociological bureaus they have specialists whose education is not at all related to the positions they hold. One can hardly expect a great return from them.

One must not forget about retraining working economists either. Engaged in current affairs they can fall behind the times with respect to the achievements of scientific and technical progress if they are not informed of these. Also the economists of enterprises and organizations are precisely the people who are the first to evaluate new technical equipment that is being created in production as well as its effectiveness. Institutes for increasing

qualifications, unfortunately, do not devote enough attention to retraining economists.

There are more than 13 million specialists with higher educations working in the country's national economy and every 10th one of them is an economist. In recent years the proportion of graduates with an economics specialty has even increased: of the 849,500 specialists graduated in 1983, 113,400 were economists. Almost one-sixth of the annual graduating class of specialists with secondary technical education are workers of an economics profile. And nonetheless in industry about one-fourth of the positions of economists are held by workers who do not have a specialized education. Thus both quantitatively and qualitatively there is much to be done in order to train economists who are capable of being organizers and people who carry out economic progress in the age of the scientific and technical revolution.

It is understandable that not all aspects of the work of economic services under modern conditions of management have been reflected in our discussion. The intensification of production and the need to manage the economy efficiently have placed them on the leading edge of production management. The problems related to increasing the role of economic services in the mechanism for management deserve interested consideration in state committees for science and technology, for labor and social problems, the USSR Gosplan and the central board of the Scientific Economics Society.

FOOTNOTES

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SHCHEKINO METHOD CONTINUES TO WORK

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 6, Jun 85 pp 145-151

[Article by G. I. Grotseskul, first secretary of the Shchekino CPSU Gorkom (Tula Oblast): "The Shchekino Method Encompasses the Territory"]

[Text] Intensification of public production requires an ever increasing degree of economy of working time and efficient utilization of labor resources. Among the progressive methods of increasing labor productivity that have become well-known the Shchekino method occupies an important place. The collective of the Shchekino Combine (now Azot PO), having set the task of sharply increasing the production volume with a reduced number of personnel as a result of the development and introduction of progressive labor norms, the combination of related occupations and expansion of the service zones, mechanization and automation of production, improvement of the structure of management and centralization of plant services, achieved a great economic and social effect.

The Shchekino chemists began to work in the new way in 1967. This work can be divided into three stages: experiment, testing and the method of management. During this time the production volume increased more than threefold, labor productivity increased fourfold, and 2,000 people or 26 percent of the overall number of personnel were released. At the same time they saved more than 16 million rubles on the wage fund. The planned capacities of the enterprise were fully assimilated and surpassed, and a good deal of housing and objects for social and cultural and domestic purposes were constructed.

I should like to emphasize especially the significance of the Shchekino method for all-around development of the worker's personality. Combining related occupations and expanding service zones have required that the general educational, skill and cultural levels of the workers be raised. Various methods of ideological-educational work and training in the system of political and economic education, in the general educational schools, the higher and second specialized training institutions and in the system of vocational and technical education have been used for all-around development of the personalities of the workers in the city and rayon.

But it must be noted that not every worker has done his part to master a second or third occupation or to service a larger number of machine tools and sets of equipment. And if in the neighboring enterprise it has been possible not to work so hard (and such a possibility, as a rule, has existed) and to obtain the same earnings, he has transferred there. The Shchekino Method has encountered difficulties because of the significant differences in the wages and the lack of perfection of planning, particularly of the wage fund, which is established in keeping with the base level.

The branch, by continuing to plan the staff and wage fund for the combine from the level which has been achieved, has placed it in an extremely difficult financial position. For the increase in the output of products (and an extremely significant one) and labor productivity have been provided mainly as a result of the intensification of existing production. And since no large allocations have been allotted for new capital industrial construction, the construction of housing and facilities for social-domestic and cultural purposes have not been financed either. Thus the initiators of the advanced methods of management have ended up in the same conditions as those enterprises where the rates of development of production are low. Equalizing has led to serious difficulties in solving social problems. At the same time, about 2,000 skilled workers and engineering and technical personnel have left the enterprise. They managed to restore the conditions of the experiment subsequently. But the city party organization drew one important conclusion from the course of all this: the economic and social effect obtained within the framework of one labor collective will be lost to a significant degree on the territorial plane if the rest of the collectives are operating under different conditions. For not everything is resolved through production capital and material and financial resources which are offered by the branch. The enterprise has vital ties with the territory on which it is located and from which it receives its major resource--personnel, and also with which it is related through the infrastructure.

In order to obtain a socioeconomic effect on the scale of the enterprise, we have decided to prepare and change over to operating according to the method of the chemical workers all industry that is located on the territory of Shchekino and Shchekinskiy Rayon. By the end of the 11th Five-Year Plan this task was basically fulfilled. There were 38 collectives which began to operate under the new conditions, which made it possible to release about 6,000 workers to be used in those sections where they were experiencing a shortage of labor force. During the years of the 11th Five-Year Plan the entire increase in the volumes of production in the rayon is being achieved as a result of increasing labor productivity. The good reserve that has been obtained (during this period 47 million rubles' worth of industrial products were sold in excess of the plan) makes it possible to count on successful fulfillment of control figures of the five-year plan throughout the rayon. Labor turnover in the rayon's industry has dropped.

At the present time, because of the dissemination of the chemists' method to all industrial enterprises of the rayon, we are managing to achieve an increase in the volumes of production with less industrial production personnel than is envisioned by the plan. But in a number of other branches of our economy such as construction, transportation, communications,

agriculture and the sphere of services, there is a shortage of labor force. There are many reasons for this, and they are generally known: the low level of mechanization of manual labor, which has come about as a result of the inadequate rates of reequipping of these branches, the imperfection of the technology that is applied, the inadequate level of discipline, and so forth. Therefore in the near future we intend to change all the rest of the collectives over to work according to the Shchekino method in order to approach everywhere the solution to the problem of balancing jobs with labor resources in each labor collective and, within the framework of the entire territory, to reduce labor turnover and, on the basis of this, to increase labor productivity everywhere.

The economic council of the party gorkom and its sections conduct inventories and certification of work positions at enterprises of various branches of the national economy in the rayon in order to eliminate less productive labor and labor with harmful and difficult conditions, including superfluous labor.

The certification is being carried out along with a complex of measures for introducing the achievements of science and technology, which makes it possible to achieve a more efficient number of work positions. The purpose of this stage, taking into account the condition of labor resources in the rayon, is not to introduce new work positions (or to introduce them only in extreme cases), but to increase the volumes of production only as a result of increasing labor productivity. But we encounter difficult problems in this work.

We attentively familiarized ourselves with the valuable experience of the Dnepropetrovsk combine builders in certifying work positions, which was approved by the CPSU Central Committee. In February 1984 in Dnepropetrovsk there was a seminar entitled "The Experience in Increasing the Effectiveness of Production in Industry on the Basis of Certification and Streamlining of Work Positions."

They discussed the draft of the temporary interbranch recommendations for certification of work positions in industry. But up to this point this work has been done mainly in the main shops and productions of machine building enterprises and, as they say, it has not touched the auxiliary sections. Yet it is precisely the service productions that have become the impeding factor in increasing labor productivity. Because of imperfection in the system of organization and payment for labor in the auxiliary services, labor turnover is great here and there is a constant shortage of workers. Without streamlining and certifying the work positions in auxiliary productions, it seems to me, it is impossible to solve the problem of balancing work positions in the enterprise as a whole. Methodological developments are needed. Economic science must be very efficient.

In our opinion, it is expedient to conduct certification and streamlining of work positions at the same time everywhere not only in terms of the branch principle, but mainly on the territorial scale, and it must be started within the administrative rayons. Otherwise there will be inevitable delays similar to the ones observed with the introduction of the Shchekino method when the high technical-economic and social achievements at individual enterprises were

dissolved on the scale of the city or the rayon and did not produce the planned final national economic results.

At certain enterprises when work positions were certified and streamlined they did not consider questions of the number of workers who received additional payments for combining jobs, expanding service zones and increasing the volume of work performed. According to data of the USSR State Committee for Labor and Social Problems and the USSR Central Statistical Administration, in 1981 in the country's industry only 5.6 percent of the average monthly number of all industrial production personnel received these additional payments. In Shchekinskiy Rayon this indicator is 12.5 percent. This is not very much either. In our opinion, the mastery and application of associated occupations and expansion of the zone of service of machine tools, sets of equipment and apparatus make it possible to increase labor productivity considerably. This is precisely the direction for intensification for production which is developing on the basis of scientific and technical progress and will make it possible more fully and rapidly to achieve a balance between the existing and newly created work positions and the available labor resources.

The balance between work positions and labor force at all enterprises is acting as the balance between labor resources on the scale of the rayon. But in solving this problem we have encountered certain difficulties. For example, in our rayon under the ispolkoms of the city and rayon soviets of people's deputies the planning commissions are extremely small in number. They are not capable of developing the plans for the economic and social development of the territory as a whole. These functions are taken on by the party gorkom which enlists public workers--Scientists, economists on pensions, and other specialists. We finally do receive this comprehensive plan for the next five-year plan but then a very important condition is not met--analysis of the implementation of the plan with a disclosure of the positive and negative tendencies and the issuance of recommendations to party, soviet and economic agencies for eliminating shortcomings and reinforcing and expanding the positive processes. It is understandable that such a system of administrative at the level of the administrative rayon cannot objectively produce the necessary return, but the inertia from many years of unproductive practice has not yet been overcome. And, in our opinion, it must be overcome, and the sooner the better.

As EKONOMICHESKAYA GAZETA announced in December 1983, according to data of the USSR Central Statistical Administration, in industry in 1982, because of the Shchekino method they managed to save the labor of almost a quarter of a million people and obtain a savings on the wage fund in the amount of more than \$400 million.

But we know not only of the clear advantages of the Shchekino method, but also of its paradoxes and the unfavorable situations in which one finds enterprises that are applying it. One of them was discussed in EKO in an article entitled "The Flagship Springs a Leak."¹ They appear mainly because of the continuing practice of planning the wage fund on the existing basis and because of the lack of interest of managers in adopting more difficult plans.

The main provisions of the Shchekino method have become a constituent part of the system of measures for improving the economic mechanism which were presented in the decree of the CPSU Central Committee and the USSR Council of Ministers of 12 July 1979. In the large-scale economic experiment which has been conducted since 1 January 1984, great opportunities are being given to managers to establish additional payments and increments for expanding service zones, combining occupations and increasing the qualifications of the workers. This, in our opinion, should play a large role in economizing on live labor.

Combining the Shchekino method with certification and streamlining of work positions on a more fundamental methodological basis and changing over from balanced work positions and enterprises to balanced ones on the scale of the territory as well as increasing the role of local agencies in implementing this--these are important sources for increasing labor productivity.

FOOTNOTE

1. See EKO, No 8, 1980.

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11772

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TECHNICAL PROGRESS INCREASES LABOR PRODUCTIVITY

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 6, Jun 85 pp 152-158

[Article G. R. Fridman, honored economist of the RSFSR (Novosibirsk): "The Productivity of Labor, Its Planning and Payment"]

[Text] Increasing labor productivity by two-thirds and sometimes even by three-fourths depends on technical progress. The annual plan for technical development which is being prepared centrally in the branches is approved by the ministries, as a rule, very late: In February-March of the year that has already begun. But the production program and the assignments for labor productivity, even if they are not established at the best time periods, are still distributed to the collectives of the enterprises and associations by the beginning of the year that is being planned. Therefore many years of practice convinces us of the need to restructure the very mechanism for consideration of the plan. It would be expedient to establish it comprehensively, including all divisions, and not separately as is done today.

Since there is a disparity between the planning of the basic indicators and the measures for new technical equipment (including the organizational and technical plan), in many cases these measures cannot guarantee the necessary rates of growth of labor productivity. There are a number of other factors that reduce the effectiveness of the organizational and technical plan: the time periods are not met for introducing many measures, some of them are completely eliminated without an adequate replacement, and some of them are postponed until a later date. For some of them the economic effectiveness turns out to be too high since at many enterprises they calculate the conventional and not the actual effect. It is difficult to carry out some of the inventions because of the shortage of capacities of auxiliary services, delays in the delivery of equipment and fittings, and so forth.

It would be expedient to strengthen the design bureaus for mechanization and automation with their base shops at large enterprises and in associations, and also the services of a branch nature for small enterprises which cannot cope with the assignment for increasing labor productivity without assistance.

Although the load on the service subdivisions is increasing, their development is proceeding very slowly. And it is generally thought that the number of

workers here should be less than the number of basic workers. In my opinion, this is an absolutely incorrect approach. The enterprises are becoming better equipped and the technical equipment is becoming more complicated. In order to service machine tools with numerical program control, robot equipment and automated lines it is necessary to have workers with the very highest skills. People released from the main production because of automation and mechanization of production processes should be sent to the service subdivisions. It is my firm opinion that it has long been time to deal with the question of eliminating the division into auxiliary and basic workers. One cannot retard the development of auxiliary services--the future of the enterprises depends on them.

The planning of indicators for labor is in need of serious improvement. In machine building they have not worked out the final cycle for their planning. Frequently there is no coordination between individual indicators--between assignments for reducing labor-intensiveness and increasing labor productivity; the plan for labor and the plan for technical development; the assignment for reducing labor-intensiveness for the annual output and for the most important items. The labor-intensiveness is not comparable for the same types of items manufactured at different enterprises.

The methods for determining the increase in labor productivity have not been perfected either. The criterion for evaluation is the conventional release of the number of industrial production personnel as compared to the report period. If the volume of production has increased by 4-5 percent and the number of industrial production personnel has remained the same the enterprise can take credit for a conventional release of a number of personnel and the technical services can claim a bonus for introducing innovations.

But in reality it sometimes happens that the number of personnel remains the same or even decreases not as a result of the realization of technical innovations, but because of the shortage of labor resources.

The ease with which reports can be submitted for plans for technical development gives rise to complacency and places the enterprise in a difficult position with respect to the utilization of the wage fund and the actual reduction of production outlays. In our opinion, the methods for determining the increase in labor productivity in terms of these factors need to be refined.

In the planning assignments for increasing labor productivity, in my opinion, one should especially single out increasing labor productivity as a result of measures in the organizational and technical plan. Then there will be greater responsibility for them and instead of a conventional effect a real effect will be achieved.

In my opinion attention should be given to the following policy for determining assignments for shops and services to reduce labor-intensiveness and economize on the wage fund during the planned year, which is being applied at enterprises of Novosibirsk. These assignments are formulated on the basis of a plan for raising the technical and economic level of production, first of all the section entitled "the introduction of organizational and technical

measures." Two areas for reducing labor-intensiveness are singled out in them.

a) from technical measures;

b) from improving norm setting.

In this case it will be necessary to account for the reduction of labor-intensiveness in the introduction of organizational and technical measures. A significant savings is achieved from the wage fund. As for improving norm setting, these directions are singled out here: First, through increasing output with technically substantiated norms if wage rates are raised at the same time, and, second, through imposing stricter norms when introducing compensation in the form of bonuses. In these cases one achieves only a reduction of labor-intensiveness, but not a savings on the wages.

Improvement of material incentives exerts a large influence on increasing labor productivity. Therefore many enterprises devote special attention to incentives for reducing labor-intensiveness. In Novosibirsk there are plants where incentives for engineering and technical personnel to introduce organizational and technical measures which produce a real release of personnel, and also for an actual reduction of the labor-intensiveness in an amount of no less than 2,000 norm-hours a year are established in the form of personal increments to the salaries. The increments are in effect throughout the calendar year. Each engineer can obtain them, depending on his personal contribution to increasing labor productivity. This stimulates a creative attitude toward the planning and implementation of organizational and technical measures. Of course this does not exclude increments to the salaries of specialists for their high level of qualifications.

One-time bonuses are introduced for workers for developing and introducing measures to increase labor productivity in the following amounts: for releasing one worker--180 rubles, two--360, three--540, and four and more--600 rubles.

The practice of creative brigades from engineering and technical personnel and workers for early introduction of especially important measures of the plan for technical development which are directed toward reducing labor-intensiveness is an extremely useful practice. It is expedient to allot a particular sum for bonuses for them from the material incentive fund. Engineering and technical personnel are awarded bonuses after the introduction, and workers--as they fulfill their assignments for manufacturing fittings, nonstandard equipment or components for these. This accelerates the course of their work.

Thus for the introduction of the most important measures for increasing labor productivity members of creative brigades are given double payment--from the bonus fund for new technical equipment and from the material incentive fund (for early implementation). But this is justified by the effect that is achieved.

As is the case everywhere, in Novosibirsk they utilize the provisions concerning additional payments for time-rate workers who, in addition to their own work, take on the responsibilities of workers who are absent who are included in the staff list. But at certain enterprises there is also a somewhat innovative approach. In what does it consist? Limitations are introduced for additional payments for the number of workers who are absent. The purpose of the limitation is twofold: first, to preclude the possibility of "driving out" workers which, unfortunately, has taken place in practice and, second, in order not to cause harm to production and not to break the rules of labor protection and technical safety. From my observations of repair workers, 18 people can to some degree cope with the volume of work intended for a brigade of 23 people. When more than five of the 23 are absent, not all of the work is done or it is done poorly. Emergency repair or minor repair on the demand of the production shops and under their observation, of course, must be carried out by the brigade. But it does capital repair as extra work and some of the jobs are skipped because it is simply impossible to do all of them. Therefore, in my opinion, it would be expedient to determine the possible limits of the reduction of the number of personnel.

Thus, for example, when the schedule is met for repairing equipment by the brigade of electrical repair workers with an incomplete group or when there is no idle time or emergencies for which it is to blame, the additional payments can be made as follows:

<u>With No. of Workers on Staff or According to Calculation , Individual</u>	<u>Additional Payment for No. of Absentees</u>
3-4	No more than 1
5-8	No more than 2
9-12	No more than 3
13-17	No more than 4
18-23	No more than 5
More than 23	No more than 6

It is very important to increase the responsibility for the expenditure of the wage fund. Stereotypically, like a stencil, from year to year, from five-year plan to five-year plan they approve the list of duties which was established by the State Committee for Labor and Social Problems and the AUCCTU, which are responsible for overexpenditure of the wage fund and which are subject to losing their bonuses. There are no technologists or designers on this list of physicians. Is this correct? Undoubtedly not. For in the assignments for reducing the labor-intensiveness of the items that are produced the lion's share (about three-fourths) should come from the fulfillment of measures in the organizational and technical plan. And these are primarily the responsibility of workers in the technical services both of the plant administration and of the shops.

In order not to violate the established provision concerning responsibility for expenditure of the wage fund and at the same time to increase the role of the management staff and technical services in correct utilization of the wage fund, at certain enterprises of Novosibirsk they are establishing concrete

assignments for reducing labor-intensiveness for the following subdivisions: the divisions of the head technologist, the head designer, special design divisions, the division for instruction production, labor and wages, scientific organization of labor, the head mechanic's division, and the division for outside cooperation and technical control.

In the list of indicators which, if unfulfilled, cause the workers of these services to have smaller bonuses, the second one after the fulfillment of the plan for new technical equipment is the indicator for reducing labor-intensiveness. Thus these subdivisions have imposed on them the responsibility for the expenditure of the wage fund. Apparently there is now a need to introduce the corresponding adjustments into the list of positions approved by the state committee for labor and social problems and the AUCCTU as responsible for overexpenditure of wages.

Taking into account the achievements of technical progress, it is time to revise the existing system of organization and payment for labor. Let us take the evaluation of the servicing of more than one machine tool. With the introduction of automated lines and robot equipment in complexes this evaluation should change. For example, in a shop, for one or several operations they used 12 machine tools which were serviced on two shifts by eight adjusters and eight machine tool workers. All of them were considered to be workers in charge of more than one machine tool. Then instead of 12 units of individual equipment they installed four automated lines which operate on two shifts. There remained four adjusters and four machine tool operators, that is, only eight people. They too were qualified as workers servicing more than one machine tool. But the overall number of workers servicing more than one machine tool in the final analysis decreased by eight, which, naturally, was reflected in the reports. The reduction of the number of workers handling more than one machine tool was evaluated as a shortcoming. Is this not a paradox?

Incidentally, practice shows that the number of automatic lines, specialized machine tools or sets of equipment installed in the shops is not limitless. The question of the normative for removing products from one line (machine tool, set of equipment) and the normatives of the number of service personnel is becoming especially critical. There is a need to develop provisions which determine the minimum and maximum number of lines, machine tools or sets of equipment serviced by adjusters, taking into account the output of products per unit of equipment. When the volume of output drops below the calculated level one should reduce the amount of the bonus or not pay it at all. Otherwise situations can arise (and, unfortunately, they do) in which the adjusters have greater earnings but they do not provide for the planned output of products.

Apparently in mass, large-series and series production there is a crucial question of revising the system of determining the assignments for reducing the labor-intensiveness of items. There should be one which is calculated for the next few years. Possibly its introduction should be divided into two or three stages, but no more. It is necessary to determine clearly that by the end of the proposed first stage the labor-intensiveness should be at one point, and at the end of the second stage--at another.

The determination of the calculated labor-intensiveness should be based on the utilization of the latest equipment, improved and advanced technology with elements of scientific organization of labor and the calculated normatives for the servicing of equipment. There should be a worker under the control of the head technologist's division and division for labor and wages who is responsible for each measure for the introduction of the calculated labor-intensiveness.

During the period of introduction of this calculated norm we should introduce a payment norm for output, from which, it seems to us, it would be expedient to fill out a standard card of deviations such as deviations of materials or batching items from the norms of the GOST. Each time it is necessary to disclose the parties guilty of the deviations from the planned labor-intensiveness until the calculated norm is introduced. This will accelerate the process of introduction and increase labor productivity.

In order to stimulate an increase in labor productivity, certain plants of Novosibirsk are establishing increased amounts of the 13th wage for those on whom the continuous operation of equipment depends--adjusters on complicated automatic lines, fitters and machine tool operators engaged in the repair of instruments; workers employed in heavy and harmful jobs with three shifts, and so forth.

Bonuses for shop chiefs occupy a special place in the system. Only shop chiefs and not their deputies, because recently the selection of engineering and technical personnel for the position of shop chiefs has become much more complicated.

In addition to personal increments, maximum salaries in keeping with the chart of official salaries and other benefits, shop chiefs are given the 13th wage in an amount of 100 percent of the average monthly earnings, but not more than 300 rubles (before this category of managers was staffed the maximum amount was 400 rubles).

Recently, from year to year the average wage level of workers has been rising while the wage rates have remained stable. The proportion of the bonus in the wages of workers is 40 percent, and in some branches--up to 60 percent. This is fraught with serious consequences. Shop chiefs and foremen can turn to partial or complete removal of the worker's bonus when there are gross violations of technology or discipline, on the one hand, or a deterioration of the quality by only a small amount, on the other. And then they can search out any ways they can find to pay the worker all of his bonus, sometimes even failing to observe labor legislation. Thus it seems to us that the large proportion of the bonus in the wages has not been an incentive to increase the

output of high-quality products or to increase labor productivity. It would seem that there is now a need to revise the existing practice. I think that the most efficient amounts of bonuses which provide the greatest incentive are in an amount of 20 to 25 percent of the wage.

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11772

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DEMOGRAPHIC FACTORS AFFECT LABOR RESOURCES

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[Article by Ye. M. Bubnova, candidate of economic sciences, Moscow State University imeni M. V. Lomonosov: "Demographic Waves and Labor Resources"]

[Text] At the July (1983) Plenum of the CPSU Central Committee it was emphasized that when drawing up plans for economic development it is necessary to comprehensively take into account and reflect the most important factors in the development of the society: social, national and demographic. Moreover, when studying the peculiarities of the modern demographic situation it is important to establish not only the number and age and sex composition of the population as a whole and the able-bodied part of it at a given moment in time, but also to draw up a prediction of the future situation. As distinct from many other factors that influence socioeconomic development, the demographic structure of the able-bodied population of the country is predicted for a long period in advance (15-20 years) with a high degree of reliability since the death rate will change insignificantly in the future, and the birth rate will be reflected only beyond the range of the period that is being predicted.

Considering the dynamic series of the number of individual age groups of the USSR population one can note in the medium-range future fluctuations which will die out in time. This enables us to introduce as a designation of the nature of the dynamics the term "demographic waves." The reasons for their appearance, the nature of their effect and the socioeconomic consequences of demographic waves have not been studied sufficiently in our opinion. Yet their role goes beyond the framework of pure demography. Inadequate accounting for the wave-like changes in the age structure of the population and the number of its individual sex and age groups leads to violations of many national economic and social proportions. In this article we wish to consider one of the aspects of the problem of demographic waves, mainly their influence on the dynamics of the country's labor resources.

What are the reasons for the appearance of fluctuations in the demographic dynamics which periodically die down? During the war there was a reduction of the male part of the population in the groups of draft age. The number of young women and old people decreases, although not so appreciably. There is a

sharp drop in the birth rate, child fatality increases and, as a result, there is a reduction of the number of children in the younger age group (up to 4 years). The sex and age structure of the country's population is deformed and anomalies appear--the so-called "killed" or "fallen (dead)" people of the war years.

When the small generation of children born during the war enters child-bearing age, the birth rate per 1000 people of all the population again declines. Thus a demographic wave appears. The rises and declines in the number of children born as a result of the change in the contingent of people of child-bearing age will be observed throughout the entire life for at least another three demographic generations. Thus up to this time one can single out in a wave of births the "harmonic" which corresponds to the First World War and the Civil War (a decline in the number of births during 1915-1919). The distance between the adjacent maximums or minimums of the demographic wave correspond to the period of reproduction of the generations which is equal to 25-30 years. The intensiveness of the dying down (smoothing out) of the wave of births depends mainly on the reproductive behavior of the population, which is related to one or another demographic policy of the state.

Within approximately 25 years after the First World War and the Civil War there was to have been a decline in the birth rate which corresponds to the least number of population of child-bearing age born during the period of these wars. This period (1940-1944) corresponded with the Great Patriotic War, when the reduction of the birth rate took place on an even larger scale. As a result there was a demographic wave whose amplitude of fluctuation exceeded 200 percent.

The decline in the birth rate during the period of the Great Patriotic War entailed a reduction of the number of newborn children during the 1960's (the minimum in 1968-1969) because of the reduction of the number of people in the contingent of child-bearing age. The next decline in the number of births is expected in the 1990's.

In the future not only the change in the country's labor potential will depend on the wavelike dynamics of the number of births. It conditions the irregularity and the rates of increase in many social and economic indicators and characteristics. Such, for example, as the economic load on the able-bodied population in the form of those who have not reached or are beyond working age (children and old people), the volume and structure of the social security funds, the demand of the population for education and of the national economy for specialists, and capital investments in the industrial and nonindustrial capital.

The demand for maternity beds, day nurseries, kindergartens and schools also changes in a wavelike way. From year to year there are fluctuations in the contingent of potential graduate students who have graduated from the secondary school and vocational and technical schools, and the number of youth of draft age. The amplitude of the fluctuations reaches, for example, for 18-year-olds during 1975-1980--30 percent, and for children of preschool age--about 20 percent. There is a corresponding change in the need for specialists

who take care of children and youth (physicians, educators, teachers, trainers, and so forth).

Along with the change in the number of people in youth contingents there are wavelike changes in the structure and absolute number of people in middle and old age. Generations which participated directly in the Great Patriotic War are becoming pensioners. The number of men and women going on pension during particular periods decreases in absolute terms. Since men and women born in various years but years which are close together become pensioners at the same time the total wave of the number of people going on pension is smoothed out, as compared to the dynamics of contingents of men and women taken individually who are going on pensions.*

The balance of the increase in the number of population of working age is determined mainly by the dynamics of two waves: the dynamic series of the number of people entering working age and the number of people withdrawing from the contingent of workers because they are going on a pension.

Corresponding to the reduction of the number of people leaving working age during the period of 1965-1970 is a simultaneous increase in the number of people entering this age, and the rates of increase in the number of population of working age have outstripped the increase in youth of working age (15-19 years). During 1975-1985 the increase in the number of middle-aged population entering the first pension five-year plan took place along with the reduction of the contingent of youth of 15-19 years (especially sharp during the 11th Five-Year Plan). As a result, the rates of increase in the number of contingents capable of working slowed down sharply.

From 1985 through 1990 the balance of the increase in the number of population of working age will be minimum since practically the maximum number of "young" pensioners (women born in 1930-1944 and men born in 1925-1929) will correspond to the smallest contingent of youth (born in 1965-1974). Despite the fact that the minimum balance will be seen in 1985-1990, the years from 1980 through 1985 should be regarded as the most unfavorable with respect to increase in the number of population who are able to work since it is precisely during this time that we have the greatest decline in the rates of increase in the number of the working contingent and it is precisely during this period that the economy is developing under especially difficult conditions.

The demographic waves, when they interact with one another, can both reduce and increase the amplitude of the fluctuations. The local extremes of the wave of those who are entering working age and the wave of those who are leaving working age are close to one another and the minimum of one wave corresponds to the maximum of the other. As a result, the amplitude of the fluctuations of the overall wave (the number of population of working age) increases (the so-called phenomenon of resonance), which entails various negative economic and social consequences. Therefore one of the goals of demographic policy should be to smooth out the amplitudes of the fluctuations and to "wear down" the peaks (crests) of the waves. On the one hand, the state policy in the area of stimulating the birth rates can contribute to mixing the local extreme and the more uniform distribution of the number of

births. On the other hand, various measures in the area of employing the middle-aged population can exert an influence on the dynamics of the wave of those who are going beyond working age.

Thus granting new benefits who are employed in public production will make it possible in the near future to postpone the real maximum of the withdrawal from the contingent of people able to work during 1990 when there will be a constant increase in the number of youth, thus smoothing out the unfavorable economic and demographic situation of the 1980's.

The birth rate during 1985-1990 directly influences the situation with respect to labor resources at the beginning of the 21st century. In the years 2001-2005 there will be a local minimum of the number of people entering pension age (men born in 1941-1945 and women born in 1946-1950. If by that time the actual limit of the working age is moved, that is, the majority of people entering pension age will work for a few more years, the actual minimum for going beyond this age will move from the year 2000-2005 to the years 2006-2010. During the same period there should be a maximum augmentation of the labor contingent because of youth born during 1986-1990 (by that time one can expect that the actual age limit when people can begin to work will be increased to 20 years). Then if after 1985 there is a reduction in the number of births, the number of people entering working age after the year 2005 will decrease. At the same time from year to year there will be an increase in the number of people who are leaving the contingent of the working population (reminding one of the situation in the 1980's with respect to the drop in the rates of increase in the working contingent). The smoothing out of the negative fluctuations and the dynamics of the numbers of population of working age can be promoted, in our opinion, by an active state demographic policy.

Experience has shown that the measures of state stimulation of the birth rate have a clearly expressed short-term effect for several years after the introduction of the benefits. Granting mothers and young families as well as those with many children new benefits can contribute to prolonging the peak period and reducing the decline in the number of births. Smoothing out the peak and the decline in the number of newborn babies could be promoted by repeated adoption of measures in various regions of the country which are directed toward stimulating the birth rate. Thus the introduction of measures providing incentives from the middle of the 1980s for the birth of a third child, from the end of the 1980s for the birth of a second child and, possibly, by the middle of the 1990s--for the birth of a first child, will contribute to greater uniformity of births.

Directly related to the birth rate is such an important economic and demographic indicator is the level of employment of the female population. In the middle of the 1980's a minimal increase in the number of population of working age will be observed along with a peak number of births and maximum amounts of temporary absence of women from public production because of childbirth (the leave to care for young children has now been extended to when the child reaches a year and a half). After that the level of temporary unemployment of women in public production will decrease, unless there is an expansion of privileges for working mothers, but if complete or partial payment is introduced for leaves for caring for young children for a period

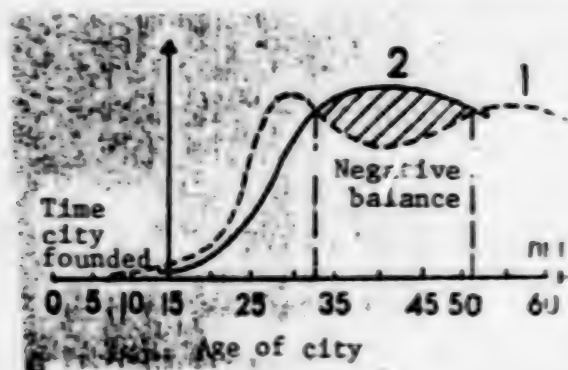
after the child reaches 1 year of age and the unpaid part of the leave is extended for a period of up to 2 years, then the level of employment of working mothers will decrease considerably less.

No less important than the problems that have been considered are those related to accounting for the influence of demographic waves on the socioeconomic dynamics of an individual region. Because of the rapid growth of cities, the dynamics of the demographic characteristics of a young city are especially interesting. Let us discuss in more detail the conditions under which a city can be provided with labor resources as a result of the natural growth of the population.

Here is a model of a young city which is being formed during the construction of a large national economic facility, for example, an industrial enterprise which is to be operated for a long period in the future. Depending on the stage of the creation of the new enterprise, changes take place in the number and in the sex and age structure of the population of the newly formed city. During the period of preparatory work and the beginning of construction the population consists mainly of men of working age (no older than 39 years). During the time of the construction of the production facilities, the installation of equipment and startup and adjustment works, the number of men considerably exceeds the number of women. Thus in 1974 during the construction of KamAZ, for every 100 women there were 196 men. As the equipment was put into operation and the output of products increased, there was a growth of the sphere of application of female labor and the sex structure of the city evened out as a result of the young women who moved there. Thus at KamAZ in 1979 58 percent of the women of working age were under 30. In 1975 for every 100 women there were 156 men, and in 1976--128 men.* With the growth of the housing fund conditions improve for the creation and the establishment of families. From year to year the birth rate increases and there are also children who have come to the new place of residence along with their parents.

After the enterprise has reached its full capacity the positive balance of migration decreases to a minimum. (One can assume, simply, that the time has come when the influx and outflow of migrants in the various sex and age groups are approximately equalizing.) Within 15-20 years after the beginning of intensive assimilation of the rayon the curve of the birth rate in the city drops to a loss since basically everyone living in the city already has a first child, and a large part of them have a second child. At the same time in the city there are the first indigenous pensioners, whose number will increase during the subsequent period. As the average age of the working population increases, the curve of the number of births continues to drop. The upsurge of the birth rate in the city takes place only after the "natives" reach childbearing age, that is, within approximately 20-25 years after the first new settlers appeared there. From the figure once can see the conditions whereby in the future the city will be able to provide itself with its own labor resources and (or) when the next wave of migration will be needed.

Dynamics of Population of Young City Beyond Working Age



Key:

1. Population ages 15-19
2. Population going on pension

Since in the first stage most of the working population is composed of people from 20 to 34 years of age (in 1979 50 percent of the working men at KamAZ were in this age group), within approximately 40 years after the beginning of construction there will be a large number of people going on pension. At the same time the number of people entering working age will drop to a minimum (since the decline in the birth rate began 20 years after the beginning of the assimilation of the enterprise). As a result, during this period one can see a negative balance in the growth of population of working age. Consequently, in the future the problem of providing the city with labor resources can be solved in two ways: either with another wave of migration during the period of the "negative" balance or by preventive regulation of the sex and age structure of the population during the preceding period. During the period of the decline of the number of births it is necessary to envision local (within the city) measures to stimulate the birth rate of second and subsequent children) for example, credit to be paid off when the second or third child is born), improvement of the labor and life of women with small children, and so forth. When developing plans for the corresponding measures in the plans for the socioeconomic development of cities and regions it is necessary to compile predictions of the demographic characteristics of the population.

FOOTNOTE

* See SOTSIOLOGICHESKIYE ISSLEDOVANIYA, No 1, 1982, p 105.

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RESPONSIBILITY FOR PERSONNEL CLARIFIED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 6, Jun 85 pp 167-169

[Response to article by V. Ya. Belenkiy, "From Hiring and Firing--To Personnel Management," EKO, No 9, 1984, by A. A. Tkachenko, candidate of economic sciences, Zaporozhye Pedagogical Institute: "Personnel--Not the Concern of the Personnel Department Alone"]

[Text] I read in INDUSTRIALNOYE ZAPOROZHYE (24 January 1984): "During 1983 the unjustified losses of working time in the oblast industry dropped by almost 20 percent, which made it possible to produce an additional 6 million rubles' worth of products. The level of mechanization of labor increased by 10 percent during the years of the 10th Five-Year Plan and almost 60,000 people were released from manual, unskilled labor. In keeping with the republic scientific and technical program, 'Labor,' during the 11th Five-Year Plan the latter figure will increase to more than 1 million workers, for which it would be necessary to create about 12,800 mechanized and automated productions."

These figures concerning the increase in the effectiveness of production cause one to think about the role the personnel services of the enterprises could play in this.

A newcomer is received tentatively and thoughtfully at the Zaporozhtransformator Association. For many years the enterprise has been providing patronage for Secondary School No 22, Eight-Year School No 86, and Boarding Schools Nos 1 and 4. In order to more fully link the interests of the young workers and the collective, at the Zaporozhye Energy Machine Plant they have developed a personal chart-plan which helps to conduct planned educational work and to reach everyone.

In order to become familiar with the comprehensive personnel work it is useful to visit the Zaporozhye Titanium and Magnesium Combine. A person who wishes to work at the enterprise goes first to the plant museum where he learns about the past, the traditions, the people and the socioeconomic development of the collective. The meeting ends by giving the worker a pass. Then the newcomers are placed in the hands of experienced mentors. In no case can one say that

all of this work is carried out by the personnel service. It would not be able to handle all of it.

Shop No 3 is drawing up the plan for social development. It turns out that 133 workers will be leaving there soon to go on pension. What step should the shop management take within the traditional procedure? It would send a notice to the personnel division. It is done differently at the combine: the shop itself must be concerned about the appropriate measures, and the general plant council for social development also asks about this. Here is how the shop managers responded to the council: in order to hire the personnel necessary to fill the vacant work positions we have stepped up the work of the council of mentors and the courses for training in second occupations (during a year up to half of the workers take these courses), classes are being conducted in the school of advanced labor methods (also involving about half of the workers during the course of the year) and conditions for labor and life are being improved.

The Titanium and Magnesium Combine conducts extensive sociological research. With the help of this they discover the weak spots on the work with personnel which should be attended to first. Do you want a "portrait" of the average violator of labor discipline? Here it is: a man from 18 to 25 years of age with less than a secondary education and no more than 3 years of work tenure at the enterprise. Sixty percent of these people are not enlisted in public work because they are considered "incorrigible." People employed in mechanized labor violate labor discipline one-half to one-third as much as do workers in heavy physical labor. Conclusions were drawn from the results of the research: the Titan Palace of Culture and in the worker's dormitories they organized clubs for various interests, creative brigades for eliminating bottlenecks in production, and special divisions and subdivisions for mechanization and automation of shops and sections. During the years of the 10th Five-Year Plan alone more than 300 measures were implemented for reducing the proportion of heavy manual labor.

During 1976-1981 the combine spent more than 700,000 rubles to prevent injuries in production. Under the 11th Five-Year Plan it is intended to improve the engineering preparation of measures for the medical service and to strengthen the material and technical base of the polyclinic and therapeutic-prophylactic institutions. More than 300 workers will receive new apartments and another 100 will improve their living conditions. Many other things are also being done under the plan for social development. This also includes personnel which goes far beyond the realm of competence of the personnel service.

One can also name several other enterprises where work with personnel is being conducted successfully. And there are also a number of them where the situation is considerably worse. But the overall conclusion is this: success

in a matter so important for production as stabilization of the collective, increased labor return and social activity is determined by the overall arrangement of all administrative activity and not just by the efforts of one of the smallest services of the enterprise--the personnel service.

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PERSONNEL POLICY EXPERIMENT URGED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 6, Jun 85 p 169

[Article by A. V. Shteyner, candidate of economic sciences, Scientific Research Institute of Labor of the USSR State Committee for Labor and Social Problems (Moscow): "An Experiment Conducted at the Enterprise"]

[Text] The attitude toward suggestions which have not undergone empirical verification is always cool, and this is quite understandable. Regardless of the splendid results that may be promised by the ideas that are advanced, their substantiation requires proof. Therefore I have a suggestion: on the basis of such a well-known association as Dneproshina, to conduct an experiment and create an integrated personnel division (for labor and social planning) headed by the deputy general director. It seems that many enterprises would take advantage of the experience of Dneproshina if it were positive.

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IMPROVEMENT OF PERSONNEL WORK URGED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 6, Jun 85 pp 169-170

[Article by I. Andrianov, chief of the Administration for the Organization of Labor, Wages and Personnel of the USSR Ministry of the Petroleum Industry (Moscow): "For Raising the Level of Personnel Work"]

[Text] Suggestions to concentrate different subdivisions and workers in a unified department under the leadership of the first deputy manager is clearly of interest. But when implementing such a suggestion one cannot but take into account the limited possibilities of the enterprises for creating the proposed sectors in an integrated personnel service since one will not be able to find scientifically substantiated normative for the number of personnel in functional services, and the limits established by financial agencies--arbitrarily to a considerable degree on the number of administrative and management workers decrease each year. Simply joining individual workers together--and the director will be forced to limit himself for this reason to one worker in the structure for performing even elementary work in this service--will not produce the expected effect. This seems to be the problem for discussion.

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PERSONNEL SERVICES RELATED TO MANAGEMENT

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 6, Jun 85 pp 170-171

[Article by B. M. Yarnov, deputy chief of the division for personnel and training institutions of the Zapryba VRPO (Riga): "The Personnel Service and the Method of Management"]

[Text] From the periodicals we learn a great deal about the advanced work experience of personnel services, for example, at the Perm Telephone Plant and in the Svetlana Association in Leningrad. But this experience is disseminated slowly. During 4 years of work as deputy chief of the division for personnel and training institutions of the Zapryba VRPO came to the conclusion that the main reason is that we are accustomed to the extensive path of management. As long as there were enough labor resources the managers tried to fulfill the plan at any cost and were not very concerned about efficient utilization of the labor force.

As was shown by a business game with the participation of workers with personnel services of all levels of management of Zapryba, the majority of managers even today set a single goal for personnel workers--to provide the labor force for fulfilling the plan. Yet the corresponding GOST has set another most important task: "the creation of conditions for increasing their (the workers' and specialists') occupational mastery and raising their occupational skill level as well as for complete disclosure of the capabilities of each member of the collective for highly productive and high-quality labor." It is precisely by solving this problem that one can stabilize the collective, place personnel efficiently and form a reserve for advancement.

The inability to pay is not the least important factor in the existing situation regarding personnel management. The existing system of incentives for enterprises from the wage fund, the material incentive fund and other funds is coordinated with the increase in labor productivity, but it does not do very much for improving the utilization of personnel. A good deal has already been said in the press about payment for labor resources.

I support the idea of training workers for personnel services through the system of specialized departments. And in the magazines there should be more

publications about foreign experience. For example it would be useful to us to become familiar with the work experience of the personnel services of the Ministry of the Fishing Industry of the Republic of Cuba.

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HISTORY OF KOLA PENINSULA SKETCHED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 6, Jun 85 pp 172-197

[Article by Yuriy Voronov, candidate of economic sciences (Novosibirsk): "Impressions in Stone"]

[Text] From time to time man comes across interesting things: a stone on which there is an impression of a plant or of a dragonfly's wing or of the leg of an ancient pangolin...there are various kinds of impressions, and some of them draw the attention of the entomologist, others--the paleobotanists, and still others--the geologist. But there are also those which elicit the interest of economists.

For more than 50 years in the center of the Kola Peninsula they have been extracting the greenish-gray rock which bears the Greek name "apatite." The peculiarities of our economic mechanism are imprinted extremely clearly on the fate of this stone.

Comprehensive Assimilation

...Through the will of the bolsheviks on the basis of natural resources (apatite, iron, molybdenum, mica, thorium, titanium and others) in the semi-tundra, where man had never stepped foot, they created a new, rapidly growing center of the Arctic Circle.

--S. M. Kirov

The Khibiny Mountains force one to study everything all the time.

--V. I. Kondrikov, manager of construction in the Khibiny

The problem of apatite ore is widely known. The problem of utilizing it comprehensively has remained unsolved for as long as the ore itself has been extracted, that is, for more than a half century. Before enumerating the existing opinions regarding the factors that make it impossible to utilize apatite ore comprehensively, let us briefly describe the essence of the problem.

The supplies of Khibiny apatite-nepheline ore discovered in 1921 are distinguished by their complex nature. It seems that many million years ago, guided by incomprehensible motives, nature set a complicated task for economic management. What can be obtained from apatite? First of all, apatite concentrate--raw material for obtaining superphosphate and other phosphate fertilizers. As distinct from all other concentrates, it is completely extracted. Nepheline concentrate, on which the attention of the press is usually concentrated, is suitable for producing aluminum oxide, from which aluminum is obtained. But, in addition to this, this concentrate is a source of soda ash which is needed by the petrochemical, pulp and paper and coke chemical branches as well as ferrous metallurgy. But this is not all. From nepheline concentrate one can obtain cement and gypsum which everyone needs, and also potash which is short supply, for which the chemical enterprises are standing in line, and right behind them are food and pharmaceutical factories and construction materials plant. Agriculture is also experiencing a shortage of potash. In 1931 in several issues of the newspaper Khibinogorskiy Rabochiy Academician A. Ye. Fersman published an article with a typical title: "Nepheline in 30 Branches of Industry." In it he laid out the spectrum of branches that consume nepheline: leather, glass, enamel, aluminum, abrasion, textile, ceramic, permutite (production of means of purifying drinking water to replace chlorination, which was considered harmful even then), potassium, basic chemical, rubber, helium silicon (production of means of purifying exhaust gases) and wood preservation.

Sphene concentrate was known even in the 1930's as an initial element for obtaining titanium whiting, the shortage of which causes inconvenience not only to housewives and Zhiguli owners, but also the fishing and commercial fleets which are docked far away from Khibin. At the dawn of the establishment of the apatite combine it included a primitive shop which manufactured whiting for domestic needs. In an unprepossessing wooden bucket women ground up sphene concentrate using champagne bottles and with a simple device extracted the pigment from the powder. This production was revived on a completely different basis in the Apatite Association. In 1983 it produced about 200 tons of pigment. A drop in the bucket, especially when one sees ships docked in Murmansk which have not been painted for a long time. The matter has gotten off the ground quite recently. At the end of 1984 a shop was put into operation for producing titanium whiteners.

From titanium magnetite concentrate, which can also be obtained in the Khibiny, one extracts titanium dioxide which is necessary for producing paper, plastic, artificial fiber, rubber, glass and porcelain. The concentrate could be a source of titanium slag and vanadium iron, and when used in ferrous metallurgy the problem of producing ferrous alloys and alloy supplements could be raised in a new way.

Finally, aegirine concentrate, which has been investigated to a considerably lesser degree, is used for obtaining a wide range of construction materials. The most modern of them is foam keralite. Metallurgical slag is now used for manufacturing it, but it could be used to a much greater advantage for other purposes, particularly for producing certain kinds of mineral fertilizers.

The sequence of the extraction of concentrates from the ore is important. At first spirited debates took place regarding which of the two concentrates--apatite or nepheline--should be extracted first. There was no difference of opinion about the fact that it was necessary to extract the two aforementioned concentrates first. This was obvious: approximately equal proportions of apatite and nepheline concentrates taken together comprise some 60 to 80 percent of the ore by weight. The majority of existing technological systems then envisioned extracting sphene and then titanium magnetite concentrates and finally, aegirine concentrate.

The argument one sometimes hears to the effect that there are no good technological systems for comprehensive extraction of all five concentrates should be regarded as groundless. The head enrichment worker of the Apatite Association, N. A. Gandrusov, named for us more than 20 technologies for comprehensive processing of Khibiny ores. The main ones are considered to be the four that have undergone complete design development. Each year new improvements of these systems appear...but only on paper so far.

Although there has never been any doubt about the need for comprehensive processing of apatite ore from the Khibiny, for many decades they did not manage to take advantage of a single one of the scientific or planning-design developments. What was the reason for this? It is fairly obvious, and our press has been making a point of it for a long time: there is not a department which has departmental interests in the Khibiny.

In conversations with the managers of the Apatite Association we recalled suggestions concerning the creation of firms--associations which were made as early as the time of the sovnarkhozes. Someone gave an example: the director of a Moscow perfume firm, Zvoboda, had arranged to have transferred to his firm a glass plant in Kalinin Oblast and a factory for aromatic substances in Krasnodar Kray. But instead of this the firm was given enterprises of the Moscow city sovnarkhoz which produced soap and juice powder. On the surface this specialization had been retained, but this did not have a good effect on the production of perfumes.

The idea of changing over to the firm structure is an alternative to the idea of combining the branch and territorial principles of management. One must either combine these principles or reject them. It is unthinkable to make a selection based on an analysis of the economic utilization of one single mineral.

The Khibiny apatite was a tough nut to crack for the physicists and chemists, technologists and miners, but for the economists it is a mystery even today. In order to solve it it is not enough to study the chemical composition of the ore; it is necessary to create an economic structure for which it is natural to have precisely this chemical composition and structure and which is oriented toward transforming the mixture provided by nature into the components needed by many branches of industry. And the most unreliable element in this structure is the branch. As soon as the discussion comes around to the branches regarding Khibiny apatite, the next step is to think about combining branches. Before combining them, they must be divided. "Combining individual branches of the economy with one another on the Kola

Peninsula is of exceptional importance. The geography of industry is to a considerable degree also the geography of combined utilization of raw material," wrote Academician A. Ye. Fersman as early as 1933.

Some 50 years later they calculated the comprehensive utilization of apatite-nepheline ores would make it impossible to obtain an additional quarter billion rubles' worth of products a year. The calculations were done jointly by the Kola branch of the USSR Academy of Sciences and specialists of the Apatite Association. There is a possibility of multiplying this sum by 50. But this cannot be done without us. There are specialists who even know how many tons the wind blows away each year from the dumps of the apatite combine: one says it is a million tons, and another says that it is a little bit less--only 600,000. We will not try to figure out who is right. The winds here are strong. According to statistical reports, there should be 450 million tons accumulated in the dumps, and according to measurements of recent years there are only 300 million tons.

All one has to do is drive along these dumps, which form uneven plateaus which rise about 10 meters above the road. They are growing every day, mainly in breadth. The northern land is not fruitful and hectare after hectare of it is taken up by these dumps. New areas for scientific research have appeared. How to keep these dumps in place and protect them from wind erosion, and how to change the chemical composition of the dumps? There is a suggestion that this composition has changed so much that a new mineral has been obtained. Its value is yet to be determined. And now the people have meekly begun to study the dumps themselves instead of asking how to get rid of them. And yet all this began in an entirely different way.

In 1932 all apatite production did not exceed the output of 385,000 tons of ore. In 1933, along with the 900,000 tons of concentrate and 1.5 million tons of ore, the apatite production was already producing as raw material nepheline, sphene and lovchorrit. On the commercial books of this polar combine there was also a chemically pure product--yellow phosphorus.

That is how it began and that is how it was. Then, because of the narrow departmental positions of the ministries that had enterprises on the Kola Peninsula, the comprehensiveness of the utilization of the resources was violated. As a rule, they took only the elements they needed and the rest of them went into the dump. And yet the majority of them were the most valuable minerals which are in critically short supply. "The state frequently had to purchase them abroad."¹

The impressive difficulty of the problem of comprehensive assimilation of Khibiny ores puts many people in the mood for somber philosophizing. There have been repeated appeals for the almighty Gosplan to take everything under control, to combine everything and to draw up an efficient program of action.

This is correct, of course, but how much can one expect? The search for a single head master does not necessarily have to go so high. All one need do is turn to the history of the national economy in order to understand that not all problems need to be solved at the upper levels of management.

A Single Master

The world looks at your inspiration.
Hasten to erect building after building,
Be a grain of sand in the great creation.
If you do not wish to be a rock...

--From slogans of the 1950s on the walls
of buildings in Kirovsk.

Because of the regimen for rigid economizing that was introduced in February 1924, the financing of geological research in the Khibiny Mountains along the line of the VSNKh was curtailed in 1925. There is now the opinion that as a result the geologists were forced to be satisfied with random sources of funds. They sometimes refer to the story about how Academician A. Ye. Fersman was taken for a beggar. After a hard and tortuous expedition the geologists arrived at the point of exit and were waiting for a train. Some old woman felt sorry for the worn-out raggedy geologist and gave him a couple of kopecks. Aleksandr Yevgenyevich kept these kopecks and loved to show them, laughingly recalling this amusing incident.

I believe that that happened. Mistrust evokes another nuance which can be seen in the publication of this same story. The 1925 expedition and also the subsequent expedition during which on 30 August 1926 they discovered industrially significant supplies would have been impossible if.... How did they write about all this? "The scientists were helped by the administration of the Murmansk Railroad which had allotted a small amount of money for continuing the work."² Why? Now people do not like to recall that the apatite ore was discovered with the money from another department. In some articles they even blame the railroad workers for putting up this money: they say that they were willing to invest money in whatever was needed if only they had something to ship.

Indeed the Murmansk Railroad had nothing to ship. Constructed during the First World War, the railroad was exclusively for military purposes and led to the ice-free Kola fjord. The rapid rates of construction--26 kilometers a day--also did not contribute to assimilating the territory through which it passed.

The board of the Murmansk Railroad certainly did not display its own initiative when it financed the geological research in the Khibiny. This activity was a part of its direct responsibilities. On 25 May 1983 the Council of Labor and Defense approved the "provisions concerning colonization of the Karelian-Murmansk area," according to which the board of the Ministry of Railways was made responsible for the task of comprehensive assimilation of the territory adjacent to the railroad. The main areas of the effort for economic assimilation at that time were considered to be increased density of the rural population. To do this the railroad was given 3 million desyatimas of land with the task of bringing in no less than 15,000 settlers within the next 2 years. The land was put up for rent for 10 years under very advantageous conditions and in fairly large amounts. Around the Belyy stop

(now the Apatity Station), for example, they allotted up to 15 hectares per family.

When one looks at the glow from the electric lights that rises up over the immense hothouses of the Industriya Sovkhoz, which has been a part of the Apatite Association since it was started, when one sees the potatoes which grow precisely on schedule, one can understand another story which took place in 1926.

"Apatite was being given industrial testing for enriching and processing as fertilizer. In order to complete the experimental work it was necessary to have at least 50-60 poods of ore. At the request of A. Ye. Fersman the task of delivering it was taken on by I. G. Eykhfeld who had worked since 1923 at the experimental agricultural station in Khibiny."³ In other articles the idea of personal services on the path to the Khibiny apatite concentrate were more exaggerated. The old woman at the train stop gives the kopecks from her hearts, the railroad workers give thousands of rubles, and the agronomist brings his friend almost a thousand tons of ore using reindeer. If we believe this we see the stage of comprehensive assimilation of the Kola Peninsula and the implementation of the target program approach, which is instructive even at the present time, dissolve into the spirit of human nobility.

A. Ye. Fersman and I. G. Eykhfeld were undoubtedly friends, but their friendship does not mean that there were no departmental barriers between them. They were working for a common cause and assimilating the Soviet North, and yet they were engaged in independent activity which obligated them to nothing and were satisfying their own curiosity at state expense.

The exceptional position of the Murmansk Railroad which was discussed above meant only the most difficult conditions under which it had to function. There was nothing exceptional about the Murmansk Railroad with respect to organizational aspects. We shall give two points from the "Provisions Concerning the Colonization of the Karelian-Murmansk area."

"Having taken responsibility for carrying out this most important state task (comprehensive assimilation of the territory--ed.), the board of the Murmansk Railroad has adopted as its main principle for its work in this area mandatory coordination with the actual needs of the USSR state economy and the real possibilities of conducting one or another measure of colonial economic significance.

"7. The main task of colonization under the conditions of the development of the Soviet economy in the USSR is expansion of productive territory, that is, comprehensively and efficiently utilized territory, and, in connection with this, increased agricultural or industrial output, or both kinds of output together."⁴

Initially the responsibility of stimulating economic life was placed on the country's railroads, and the functions of the Murmansk Railroad was then defined as one of the concrete appendices of the overall approved principles.

"By a provision concerning the boards of railroads the latter are called upon to play an active creative role as stimulators of the country's economic life. The first and main task of the board is the determination of the initial branches of state industry and agriculture which are related to the railroads by mutual interests."⁵

And then they allotted 15 hectares of land per family along the Murmansk Railroad. Let us note that for the beginning of the 1920's when collectivization had not yet gone beyond the first experiments, this was quite appropriate. Incidentally, agricultural colonization of the Kola Peninsula still did not become the leading form of comprehensive assimilation of this region. Mining and extracting became the leading branch. But with all this the stage of assimilation, in which the railroad was the leader, can hardly be forgotten. It is instructive in many respects, particularly because of the economic assimilation of the BAM zone. Sometimes the experience of the Murmansk Railroad is presented in such a way that it seems that it did not make any difference to the railroad workers what they shipped, just so long as there was a little more to ship. But is this bad? It is worth thinking about.

Let us return again to the problem of comprehensive assimilation. But if previously we presented it only as a task of comprehensive utilization of apatite-nepheline ore, now let us take a broader view, temporarily separating it from the 300 million tons of wastes.

Right there around the Kola Peninsula is a low rock fence. It is the water catchment area of Keyva, which when translated from Finnish means "rocks." But on the slopes they have found a surprising mineral, kianite. From it one can directly obtain silumin--an alloy which is now being smeltered from aluminum and several additional precipitates. Close to the Finnish border is one of the largest deposits in the world of soft mica--vermiculite, which is "nonprofile" for the Ministry of Industrial Construction Materials. It is not a regular product of the Ministry of Fertilizers either. And it would hardly be expedient to create yet another ministry for it....

Leafing through the yellowed pages of the newspaper Khibinogorskiy Rabochiy, I came across a small note in the issue from 9 August 1931. It announced that the Apatite Trust had allocated significant amounts of money for prospecting for diatomites. This is a rock which consists of shells of diatoms, is porous, and reminds one of the widely known Armenian tuff.

The next day in a conversation with specialists concerning this what seemed to be an event of little significance more than a half-century ago made me laugh. How? The trust whose goal was to extract the raw material that had been prospected for fertilizers is spending money on prospecting for diatomites? This is on the products list of the Ministry of the Construction Materials Industry! But perhaps, because...it is simpler to fill out the order and wait.

Indeed, diatomite is a heat- and sound-insulating construction material. And how necessary it was (and still is necessary) to have heat insulation for the premises in the Far North!

Another "nonprofile" matter which the Apatite Trust engaged in was the assimilation of the polymetal deposits of the Moncha-Tundra--an uninhabited area on the opposite shore of Lake Imandra. Now standing on that shore of the lake is the city of Monchegorsk and smoke billows from the pipes of the Severnikel Combine which is under the jurisdiction of the Ministry of Nonferrous Metallurgy. At one time it was possible to construct a plant for nonferrous metallurgy without crossing departmental barriers.

The concern of the communist party is always manifested in a concrete way. For the Khibiny mining industry this concern was personified in a surprising individual, an outstanding figure in the party and the state, Sergey Mironovich Kirov. Since A. Ye. Fersman gave his report in Smolnyy in 1926, S. M. Kirov has been the inspiration and the organization of Khibiny construction. Twice he managed to visit the location of the city which was subsequently named after him: 1 January 1930 and 8 June 1932. S. M. Kirov devoted special attention to comprehensive utilization of apatite-nepheline ores. It was because of him that the trust, which extracts raw materials for mineral fertilizers, conducted geological prospecting in Monche-Tundra for copper and nickel ores.

The Khibiny rocks have gathered in a surprising way the impressions from three national economic programs which were developed and began to be realized after the revolution: 1) the construction of railroads; 2) electrification; 3) chemization. The plan for the Murmansk Railroad was one of the parts of the immense program for the creation of a railroad network in the European North, which consisted initially of 35 plans for railroad lines. Each of them was completed in 1916 at the level of planning proposals. But it was not until 1919 that the commission for new railroads finally refined the composition of the program for railroad construction in the North. To one degree or another the program was realized during the years of Soviet power.

Therefore, although apatite owes its economic assimilation to the railroad which "chanced" to appear nearby, in fact this assimilation took place only because of the previously established program for the construction of railroads, and the first of the programs which were realized systematically and consistently under the conditions of the new social structure.

The most widely known program and undoubtedly the one that deserves the most constant research is the program for electrification--the GOELRO plan. It is directly related to our subject because of the priorities which in the 1920's were arranged in a different way among the programs for electrification and chemization. Long-term planning during the years of the 1st Five-Year Plan continued to be based on the program for electrification.

Nobody had any doubt about the primary importance of the task of electrification, but there existed the point of view according to which the two programs--electrification and chemization--should be realized in parallel. In the middle of 1921 a group of leading scientists went to the Sovnarkom with this suggestion.

Ten years passed between the meeting of the SNK and the recollections of E. V. Britske. These were what demonstrated the correctness of Lenin's idea of sequential replacement of programs. A great deal changed during these years. The changeover to the implementation of the program for chemization was accelerated, and the external form of the acceleration was the "Note," which was sent to the Sovnarkom on 14 March 1928. The initiator for drawing up the "Note" was Academician A. N. Bakh, but it was signed by 37 other leading Soviet scientists, including Academician I. S. Kurganov, N. D. Zelenskiy, A. Ye. Fersman, E. V. Britske, D. I. Pryanishnikov, A. Ye. Favorskiy and others. To be sure, there was not a single economist among the authors. The "Note" was directed against the point in the draft of the 1st Five-Year Plan according to which expenditures on the development of chemistry would be regularly reduced during the course of the five-year plan: from 82 million rubles in the first year to 55 million rubles in the last year.

On 18 March 1928 PRAVDA published a report on the meeting of the chemists who signed the "Note" and party and government leaders. Summing up the results of the meeting, V. V. Kuybyshev said: "The plan for national economic development should fully take into account not only the energy balance, but also the chemical balance, which is quite necessary for correct planning. In addition to the country's electrification, its economy should also be based on the plan for chemization."

On 15 December 1928 the USSR TsIK adopted the decree, "On Measures for Increasing Productivity," which set the task of increasing the productivity of all agricultural crops by an average of 30-35 percent during the five-year plan, primarily through increased utilization of mineral fertilizers and mainly superphosphate. But in spite of the heroic efforts of miners and chemists, the adjusted five-year plans for chemization, which had been approved by the Fifth Congress of Soviets and the 16th All-Union Party Conference, was not realized. In particular, the plans for producing superphosphate were unfulfilled by a total of 18 percent. Of course production did not stand still, it increased more than fourfold, but the initial variant of the five-year plan envisioned a 17.7-fold increase in the production of superphosphate, and the optimal, most difficult variant--was 22.7-fold!

Recollection of the heroic efforts is not simply an eloquent phrase. Regardless of how much may be written about the first Khibiny five-year plan, they can never fully describe the heroism of the first builders of Khistrovsk and the apatite combine. "It was so crowded that people lived not only in the attic of one of the first three log cabins where the village soviets had been housed since 7 July 1930, not only in tents, but also completely out in the open, as it were, among the apatite and nepheline syanites."⁶ The slogan "You Live Where You Work" was consistently realized. The medics lived in the health points, the managers--in their offices, and the enrichment workers--in the factory that was under construction. Vasilii Ivanovich Kondrikov, the legendary commissar of the Civil War who took over the position of director of the apatite trust at 29 years of age, slept 3-4 hours a day. The secretary of the party cell, Grigoriy Prokchenko, who was the same age, was his first geological engineer. He died under an avalanche of snow in 1935. A hero of the Civil War, Nikolay Nikolayevich Vorontsov, a respected citizen of the

cities of Kurgan and Kirovsk, was in charge of the construction of the first enriching factory. All of them worked 18-20 hours a day.

Such people and such self-sacrifice--and the plan was fulfilled by only 18 percent for superphosphate and 66 percent for concentrate.... There is something to think about!

And the answer is simple: superphosphate plants did not accept concentrate since there were no capacities and they did not have enough sulfuric acid. Incidentally, the factory whose construction was managed by N. N. Vorontsov was called an apatite-nepheline factory and was to have enriched not only apatite, but also nepheline. But what good was nepheline if the plan for the basic raw material for fertilizers was fulfilled by less than one-fifth? Here we have approached the source of the appearance of millions of tons of valuable raw material in the dumps.

Two apatite-nepheline enriching factories are now operating in Kirovsk: ANOF-1 and ANOF-2. The abbreviations have been kept since 1930. But how modest the letter N now appears! In 1932 a decision was made concerning the construction in the Khibinogorsk nepheline factory in the plant for producing titanium oxide, but instead of this they expanded ANOF-1. Since that time there have been arrears in the output of nepheline concentrate as compared to apatite. In 1936, for example, the amount of it produced was 0.3 percent of the amount of apatite. The Great Patriotic War wiped out the last traces of comprehensive utilization of Khibiny ores. And only now, 40 years later, are we beginning the difficult assimilation of nepheline concentrate--the second of the five listed above.

Final Results

My friends, native Kirovians,
The homeland sees our hard work...
On the Don steppe, in the expanses of Kazakhstan
Wheat fields are flourishing everywhere.
And if here, in this gray and stormy place,
We had not built our city in the mountains,
Perhaps there, under the hot southern sun,
The grain would not have grown so joyfully.

--Nikolay Godovski, Kirovsk

In order to simplify the complicated problems of comprehensive processing of apatite ores, it is necessary to solve a problem of planning mineral fertilizers, which is crucial even with incomplete processing of the same ores. The application to the soil of one ton of phosphorus pentoxide increases the productivity of winter wheat by 20-25 tons, potatoes and sugar beets--by 60-70 tons, and raw cotton--by 5-6 tons.⁷ "It has been established that with an increase in the content of P_2O_5 in 100 grams of soil by only 1 milligram, the productivity of grain crops increases by approximately 0.3 quintals per hectare."⁸

If because of apatite concentrate one achieves a sharp increase in productivity, one can develop a system of credit for future increased productivity and create good conditions for Khibiny miners and develop production on the basis of this credit. For quintals of wheat and cotton, tons of potatoes and sugar beets--these are real values even if they will not exist until a year later.

When they heard me the specialists frowned.

"What?" I asked uneasily. "Are the figures incorrect?"

"The figures are correct," the specialists assured me and sighed in a friendly way. "If, of course, in the given soil there is a critical shortage of phosphorus."

"But is there not one?"

"On approximately half the planted areas, or, more precisely, 52 percent...."

Three main chemical elements are necessary for agricultural plants. In addition to phosphorus they need nitrogen and potassium. In recent years they have added to these leading three boron and molybdenum, but these newcomers are only just now being included in the national economic plans. It has become customer to plan the production of mineral fertilizers with nitrogen, phosphorus pentoxide and potassium oxide--the three leading nutritive components.

There are two methods of planning fertilizers translated into nutritive substances. First we shall discuss the first method, whose history is especially instructive.

At the very beginning of the 1930's there was a system of calculating the volume of mineral fertilizers which was based on the so-called conventional fertilizers--units of measurement which correspond to a content of 20.5 percent nitrogen, 17.8 percent phosphorus pentoxide and 41.6 percent potassium oxide. The conventional fertilizers reflect the structure of the production of mineral fertilizers during the 1930's. They have nothing to do with the real needs of the soils in our country.

Yet the planning and accounting for mineral fertilizers in conventional units is retained to this day. Criticism of conventional fertilizers is growing stronger from year to year, but state statistics and planning agencies strongly support them. In parallel there is another method that is more modern. At the same time it is simpler, since in it the ratio of the structure of the production during the 1930's is replaced by the ratio $N:P_{2O_5}:A_2O = 1:1:1$. This ratio does not coincide either with the structure of production nor with the structure of the need, but it significantly simplifies accounting and planning.

The transformation of planning and accounting into some kind of relatively independent reality, irrespective both of production and of the need, took

place in the second half of the 1960's. While some links remained, they were more with production than with the needs.

Perhaps the orientation toward production started in the 1960's to acquire the taint of the notorious department interests. The Ministry of Fertilizers was separated out from the Ministry of the Chemical Industry. This is what it was called for a little more than a year and then the title was made more precise: Ministry for Producing Mineral Fertilizers.

Up until the middle of the 1960's in our country we produced mainly simple mineral fertilizers: nitrogen--ammonium nitrate, urea, sulfate and ammonium sulfate; phosphorus--simple and double superphosphate; potassium--potassium chloride and potassium sulfate. But....

Agricultural science established that the plants have no element-by-element specialization. The planning agencies listened to the recommendations of science and began to produce complex fertilizers. But the former system of accounting and stimulation remained, and it is still in operation in spite of scientific recommendations. For instance, at a superphosphate plant they now produce ammophos, and it contains, in addition to 49 percent phosphorus, 11 percent nitrogen. But the plant is accountable only for the phosphorus. Incidentally, it is easier with ammophos: it still contains more phosphorus. But the agrochemists made it even more difficult for the management workers. They included: nitrophoska--a percentage ratio of nutritive substances of 11:11:11; nitroammophoska--17:17:17; and carboammophoska--20:20:20. As if deliberately, everything is divided into equal parts. We have already discussed the reaction of the management system: it created the Ministry for Producing Mineral Fertilizers, and thus the agency responsible for their application disappeared. The statewide problem was transformed into an intradepartmental problem, but it was still not arranged to account for all the nutritive substances in the fertilizers.

The difficulties here are fundamental; they are the same ones as existed with the extraction of complex ores. But the tiresome complexity here is not at the beginning, but at the end. The titles of all-union industrial associations such as Soyuzfosfor, Soyuzkaliy and so forth show that the structure of management continues with enviable persistence to correspond to the well-arranged system of the table of D. I. Mendeleyev.

To be sure, that same Dimitriy Ivanovich wrote: "When using artificial fertilizers one must not forget about the essential rule that one kind of fertilizer cannot do the same thing that is done by a combination of fertilizer substances."⁹ Separate application of simple fertilizers increases expenditures on their preparation and application 1.5-2-fold. Therefore if we want to be oriented toward a high final effect, and not toward chemical elements, the combination should be placed at the basis of the organizational structure.

Is it possible to create a system of management which would strengthen the complex nature of the products that are produced? After all, by the beginning of the current five-year plan we were producing "about 330 kinds of fertilizers and herbicides."¹⁰ There are only two ways of figuring out their

diversity and determining the necessary production structure. The first is centralized determination of the needs of the land for mineral fertilizers; the same kind of centralized planning of their production according to established products list. The second is to provide for a dictatorship of the consumer and rapid reactions on the part of production to his demands. An orientation toward the final effect is achieved in both cases.

But in the first variant we encounter the aforementioned problem--science is organized in a different way from the way an economy should be organized. Scientists obtain pure substances and it makes no difference to the researcher how much this cost: they are necessary for science. But what about economic life? First we receive concentrate and are excited about the high content of phosphorus pentoxide in it. But we do not notice that at the same time during the course of enriching we have taken out those elements which will then have to be added when obtaining comprehensive or complex fertilizers. In the first stages of the assimilation of the Khibiny minerals there was suspicion that it was necessary to enrich them for potassium, that is, to obtain a concentrate with a high potassium content. Now there are no doubts. What does one think when the subject turns to the tasks of Soyuzfosfor: This is not Soyuzkolly... And the technology for enrichment is arranged in such a way that most of the potassium goes to the dumps so that the phosphorus radiating in it is found with the potassium of the Northern Urals somewhere near Leningrad or in the Ukraine. If one knew the actual organizational structure of the production of fertilizers, one can also understand the marriages and divorces of phosphorus and potassium, but from a national economic point of view it is simply absurdity.

The main path to a high final result is the dictatorship of the consumer. From a standpoint of national economic tasks not all consumers have the same priorities. Industrial crops, for example, are considered to be more important. They have certain advantages when provided with fertilizers. When there is a shortage of fertilizers applying them to the priority crops is an inevitable and explicable measure. If the conditions are dictated by a consumer who does not differentiate according to the degree of priority, the distribution of fertilizers which is expedient from the standpoint of national economic interests will be violated. This can lead to the appearance of disproportions and in the final analysis the interests of the consumer himself will suffer. This is the negative aspect. But there is also a positive side of this kind of dictatorship.

If the consumer dictated his conditions to production, the expansion of the production of many new kinds of fertilizers would proceed at significantly more rapid rates. Beginning with the 9th Five-Year Plan we have posed the task of extensive introduction of nonchlorine fertilizers. But up to this point they are expensive and comprise an insignificant proportion of the products that are produced.

What do nonchlorine fertilizers mean? Have you ever gotten hold of a watery potato which had not even been frozen and still it had an unpleasant taste? This is because the potato is a crop which is sensitive to chlorine. Grapes, buckwheat, tobacco, oil-bearing crops and citrus crops do not like chlorine

either. All of them need dechlorinated fertilizers. But there are not enough of them.

Another advantage of a dictatorship of the consumer would be the inevitable rapid increase in the production of defluorinated phosphates. They are obtained from apatite, but they are used not only for fertilizers, but also for feed supplements for capital. The successes of animal husbandry in developed countries of the West are explained largely by the extensive application of feed supplements. Their production is developing fairly rapidly in the USSR as well--some 160,000 tons in 1965 to 3,240,000 tons in 1981, or translated into nutritive substance--from 29,900 to 616,500 tons during this period. The rapid increase in the production of feed supplements took place during 1970-1975. It is during this period that one sees the maximum increase in milk yields, wool yield and so forth.¹¹ Most of the feed supplements are phosphate, comprising about 85 percent.

It would seem that the most efficient path to the final result lies in between the two variants that have been considered: evaluation of national economic priorities and a dictatorship of the consumer.

In this regard the 1920's are also interesting. Before 1920, as we know, the state industry was managed in a strictly centralized way, and individual enterprises did not even have partial economic independence. Along with the changeover to the new economic policy in industry trusts were formed with complete cost accounting [khozraschet], including Fosfatotuk, which supplied more than 13 percent of the commercial output of the main chemical industry, and 90 percent of the production of superphosphate was divided between it and the Uralkhim Trust. Half of the main chemical products were produced by Yuzkhimrest (the Ukraine). A competition developed between the chemical trusts and the clear winner was Yuzkhimrest, in comparison to which other chemical trusts looked like dwarfs. Representatives of the chemical trusts gathered in Moscow in the summer of 1922 with the goal of creating a unified sales syndicate. Differences of opinion led to a situation where the presidium of the VSNKh suggested instead of a syndicate forming a council of congresses of the main chemical industry. But this coordinating agency turned out not to be capable of managing.

At the end of 1929 Vsekhimprom was organized--for stepping up the struggle for accelerated development of the chemical industry in the USSR. The Apatite Trust was created on 13 November 1929, a month before this. One of the first decisions (6 February 1930) of the Vsekhimprom board was to cut in half the volume of work in this trust. It was moved to Leningrad at the same time, and only 500 people were left working in the Khibiny. Not long before that, on 4 October, Academician A. Ye. Fersman spoke at the presidium of the Gosplan and on the next day a decree was adopted by the RSFSR Economic Council in which Khibiny ores were recognized to be of primary significance in the matter of providing the country with phosphorus raw material and a task was set to reach an annual mark in the output of ore of 1 million tons.

In 1930 the planned assignment was fulfilled by only half, and a considerable amount of blame for this goes to the management of Vsekhimprom, which took an obstructionist position with respect to the assignment for the Khibiny. In

May 1930 a special decree was adopted by the Central Committee of the VKP(b) concerning Khibiny apatites, since the position of the Vsekhimprom board had become obvious. "Only direct intervention by the VKP(b) Central Committee put an end to the extravagant waste of time and effort intended for the creation of an apatite industry in the USSR," writes V. S. Lelchuk. "The radical change seen in the Khibiny in the summer of 1930 took place thus not because of, but in spite of the activity of the All-Union Association of the Chemical Industry."¹⁴ The VSNKh administration which had the most people--2,300 employees--was subjected to a purge in the summer of 1930. Now, more than 50 years later, it is permissible to change from evaluating the activity of individuals to an overall evaluation of the situation which had taken form in the structure of the administration at that time. "It had been taken over by bureaucratism and red tape"--the newspapers wrote at one time about the workers of the Vsekhimprom staff. What was the reason for this?

After all, on the one hand, regardless of where we may have gone from Vsekhimprom along the administrative ladder, the attitude toward the matter changed radically. Under the difficult conditions of the transpolar area, with the shortage of funds, machines and materials, a city, mines, pits and enriching factories were being built. Brigade and shift cost accounting were being introduced. We honor the memory of the indefatigable Academician A. Ye. Fersman who spoke at various meetings, persuaded and gave proof.

At the highest level of management, in the Council of Labor and Defense, they did not even think about expenditures of time and energy. And it was precisely at that time that Vsekhimprom came out openly against increasing the production of mineral fertilizers and managed to get additional allotments of currency for importing the fertilizers which it was unable to produce! (True, it actually obtained less than a tenth of this sum).

Then, in 1930, it was thought that all one had to do was replace the poor workers with good ones in order to move rapidly forward both in the development of chemistry as a whole and in the extraction of apatite ore in particular. Now, a half-century later, we see that in this case it was the position that changed the man and determined his interests. But why was the Vsekhimprom board dissatisfied with the fact that the Council of Labor and Defense had adopted a decision "without consulting" with it, had abolished state decrees without any right or justification?"¹⁵ Did they speak out against the government itself out of indignation? Do we not attach too much significance to personal psychological qualities? It is best to look into the logic of the behavior of the management of the main board. On the one hand, in 1927 Glavkhim had refused 174 million rubles' worth of capital investments which were due to it according to the draft of the 1st Five-Year Plan: they said they would not be able to assimilate this amount. On the other hand, in May 1930, in the decisive year of the five-year plan, Vsekhimprom (actually the same people) asked for 3.87 billion rubles' worth of capital investments and promised that by the end of the five-year plan the production of fertilizers would amount to 12 billion tons, that is, there would be a 10-fold jump in 2 years (!). The viewpoint that departmental interest is an objective category is now gaining acceptance. If psychology plays some role here, it should be explained primarily by external circumstances which have nothing to do with the psychology of individual managers.

What were the objective circumstances which formed the psychology of the workers of Vsekhimprom?

Because of the economic boycott of the country and the economic ruin, the prices for fertilizers increased considerably compared to the prerevolutionary level. While in 1913 a pood of superphosphate cost 20 percent less than a pood of rye, at the beginning of the 1920's it was 40 percent more expensive.¹⁶ The sales crisis of 1922-1923 was related to the fact that fertilizers had not been purchased. Costly fertilizers were not popular even among the kulaks, the more since they could not be purchased by the weak kolkhozes which had just gotten on their feet. Under these conditions, the VSNKh adopted a decision to reduce the prices for fertilizers to one-fourth the previous amount. At the same time they increased the subsidies for the industry producing mineral fertilizers, which even before this had been operating at a loss. But the increased subsidies could not compensate for the reduced prices because of the overall shortage of financial means.

This is why the Vsekhimprom board, alluding to financial difficulties, decided not to reduce the prices for goods from mass production that go to the cooperatives and the large groups of consumers. Thus in the drive for 3 million rubles in order to augment the circulating capital of the chemical industry they forgot about one of the most important tasks of the country's collectivization--"preferential provision of the peasantry with inexpensive chemicals."¹⁷

The formation of the departmental interest was brought about by the situation in which the department loses its orientation toward the final result, the national economic effect. The victory of the departmental interest over the state interest begins when it becomes difficult to do without the given department. It should be given the task of taking over responsibility for improving quality without additional expenditures providing for circulating capital without any credit at all, and so forth. Almost immediately after this, group interest, which is now called departmental interest, appears around such a mandatory and practically impossible task. "They cannot do without us"--this thought serves as a basis for departmental interest, a fragile basis if they have not been able to convince others of this, and an extremely reliable basis if everyone is convinced. Departmental interest is directed primarily toward the immediate result, and concern for the future is typical of statewide and nationwide interest.

The shortage of mineral fertilizers in USSR farming in 1940 amounted to 68.3 percent in terms of phosphorus (data of Academician D. N. Pryanishnikov). If at the present time one does not take into account the uneven distribution of fertilizers, there is no shortage of phosphorus. This immensely significant event passed practically unnoticed. It affects the life of each individual and all future generations, but who knows about it? Only specialists in agriculture.

The undoubted debt of the Soviet press to the workers of the Khibiny has not yet been paid. The great deed they accomplished remains little known. Not only the fact itself, but also its significance has not been publicized.

There is no doubt that we can be proud both of the new plant and of the large harvest. But do we always think about how many nutritive substances have been taken from the soil with this crop, about how many of them remain in the soil for the life of our children and grandchildren? Alas, not always.

Mineral fertilizer production clearly illustrates one other problem which is of principal significance that has been set for national economic planning. Does a planned economy mean to dig up everything, extract everything and put everything to work? Perhaps it is time to introduce into the system of planning the category of multiplying the wealth? This question, which has been raised by life itself, was reflected in the text of the USSR Constitution. It is gratifying that this beginning was followed by new normative acts which reflect the concern of those who are living now for future generations.

With respect to mineral fertilizers this general problem flares up when it comes to fertility. The effect from a fertilizer is divided into two parts--current and residual, for adding to the next harvest and for increasing productivity in subsequent years. At the present time they manufacture from apatite only those fertilizers which produce mainly an immediate effect, and practically all of the nutritive substances are removed with the next harvest and are not accumulated in the soil.

As highly effective fertilizers, these counteract others: phosphorite meal, phosphate slag, although no in-depth research has been conducted to compile the total effect. For the Nonchernozem Zone, for example, in recent years they have again begun to propandize the application of phosphate slag and even marten furnace slag, which is obviously the most inexpensive kind of fertilizer.

On the whole, the development of the evaluation of the total effect from mineral fertilizers is impeded by the lack of generally accepted solutions to scientific and methodological problems. The complaints made against economic science at the July (1983) Plenum of the CPSU Central Committee pertain fully to this sphere.

When V. I. Lenin discussed his dream of "covering Orel Province and others with phosphate," he hardly had in mind fulfilling a single annual plan for procurements. He was speaking about a stable, reliable future.

"During the years of the 10th Five-Year Plan the volume of production of mineral fertilizers reached 104 million tons of conventional fertilizers per year and the proportion of concentrated and compound fertilizers in the overall balance amounted to 84 percent. In 1980 for every 1 hectare of plowed agricultural land there were 3.7 quintals of conventional fertilizers. While previously when distributing fertilizers preference was given to industrial crops, at the present time there is a possibility of using them for grain and feed crops, potatoes, vegetables and perennial plantings.

"As calculations show, the application of mineral fertilizers provides for approximately half of the increase in the yield of grain crops. At the same time, in spite of the high effectiveness of the application of mineral

fertilizers, they are now being applied on approximately half of the area planted in grain crops."¹⁸

A sincere concern for where the fertilizers went and what their effectiveness would be is shared by the collective of 20,000 members of the Khibiny Order of Lenin and Order of the October Revolution Apatite Association imeni S. M. Kirov.

Each day 750 carloads of concentrate leave Kirov for the South. The successes achieved by the association were the result of the self-sacrificing labor of the workers, engineering and technical personnel and employees who, despite the constant growth of the facilities for production and the difficult climatic conditions of the polar region, were able to solve many difficult problems of a technological, organizational, economic and social nature.¹⁹

The labor of these people makes it incumbent on the next link in the chain, which extends from apatite ore to high yields, to work with no less self-sacrifice. Otherwise a considerable part of the labor efforts in the polar mountains can be spent in vain.

When the two ministries--the Ministry of Agricultural Machine Building and the Ministry of Machine Building for Animal Husbandry--argue with one another about who is to produce the fertilizer distributors, each day of delay is a bureaucratic attack on the collective of Khibiny miners. When the fertilizers are loaded into the wrong kinds of cars and 6 percent of them are lost en route--this is also the same as scorn for the labor in the severe Khibiny Mountains.²⁰ And if there are no agrochemical charts or the fertilizer deliveries are unreliable or else it is generally unknown which fertilizers will arrive at the kolkhoz, this is a real shame for which it is difficult to find a name.

Georgiy Aleksandrovich Golovanov discussed how a group of drillers and truck drivers had come to visit him, the general director of the Apatite Association. They came during his reception hours for personal problems. They discussed how when they were in the South on vacation they had seen mountains of superphosphate standing out in the rain next to the strip of railroad. When you arrive from the city, the workers said, you are met with the slogan: "Working on the Resvumchorr Plateau Is Not Only Difficult, But Also Honorable." What are all these difficulties and honor? So that our fertilizers will be wasted without producing anything except harm? We pollute the soil--that is the only result. As a deputy of the USSR Supreme Soviet, G. A. Golovanov dealt with this specific case and the guilty parties got what they deserved. The mountains of fertilizer beside the railroad disappeared. But there is no guarantee that they have not appeared somewhere else, just as there is no guarantee that the mountains of valuable wastes around Kirovsk will not grow and be blown away in the wind. But such guarantees are required by the present stage in comprehensive improvement of developed socialism, and the changeover of the economy to the intensive path of development.

When you look at the impressions on the rock of fertility which has been left by the history of economic management, the greatest hopes are placed on successful untangling of the clump of problems precisely with respect to the

final result. No less promising are the prospects of introducing the target program method into the practice of planning and management. But ideas of comprehensive assimilation can in no way be conjoined with the branch principle of management.

FOOTNOTES

1. PRAVDA, 16 March 1983.
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11772

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HANDLING OF CONFLICTS DISCUSSED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 6, Jun 85 pp 198-203

[Article by G. A. Denisov, chief of the main board of the Ministry of Power and Electrification, and G. Ye. Zhuravlev, chief of the psychology department of the VNIPKEnergo (Moscow) of the book by F. M. Vorodkin and N. M. Koryak "Vnimaniye: Konflikt!" [Attention: Conflict!], Novosibirsk, "Nauka", 1983, 143 pages]

[Text] Managers are afraid of conflict. As soon as hidden hints and unclear complaints begin to spread in the collective the manager becomes uncomfortable. And when insulted and indignant workers burst into his office showing that a former friend had committed a scandalous act (how long she was able to conceal what she was really like!), that no real (!) manager should tolerate such a disgrace and so forth, he has a natural desire to put a stop to the conflict as quickly as possible and once and for all. It is easy to understand the reasons for fearing conflicts. In the classroom the future production manager studies the laws of technology, the principles of designing machines and formulae of economic accounting; they teach him to repair equipment, but (with rare exceptions) they do not give even the elementary information about how to ensure smooth, highly effective work of the production collective.

Having become a manager, the former engineer tries independently to invent principles of behavior which would help him avoid conflict situations.

Certain managers react to mutual reproaches on the part of their subordinates (next in line is the manager) with the standard phrase: "I will give you a week (month)! If you have not settled this, I will fire you both!" Even more frequently one encounters managers who, in a hurry to put a stop to the conflict, prefer to fire one of the parties to the dispute, usually the one in the junior position. The "surgical" method of resolving situations of conflict seems to the majority of managers to be the most effective, although not all of them decide to apply it.

Another extreme type of behavior is when the manager tries at any price to reconcile the hostile parties, listens attentively to all complaints, explains

details, persuades, inspires and...unnoticeably places the collective in unending disputes. The avalanche of rumors, gossip and slander increases, blocks and groupings appear and nobody works any more--everyone is condemning everyone else.

The book that was published by the "Nauka" publishing house by F. M. Borodkina and N. M. Koryak¹ helps the manager to fill in the gaps in his education and understand the reasons for differences among coworkers, their arguments and conflicts. The book is intended for the reader who, possibly, has never held in his hands a textbook on sociology or psychology of management. Therefore the presentation is arranged as a sequential set of typical situations of conflict. The authors did not suggest simple formulas for resolving conflict; it is as though they slightly open the curtain over the motives for human contradictions.

The background of the content is arranged unobtrusively and without haste: concerning the nature of the conflict, its structure and processes. By the end of the book the reader notices as a pleasant surprise that he has not only figured out the reasons for familiar conflicts but also, to some degree, has mastered in detail the theory of conflict that has developed.

Therefore the discussion of the book must also be on two planes: figuring out the situations and analyzing the main points of the theory. Completely approving of the dialectical goals of the authors, we nonetheless shall try to separate these two planes and make them clearer in order to have an opportunity to formulate our attitude both toward the theoretical points and to the breakdown of specific situations (the numbers of the situations will be given from the text of the book).

The main thing in the authors' conception is the system of ideas concerning the structure and functioning of the organization as a whole, the activity of individual people and of production collectives. These ideas can be briefly summed up in the following way:

Each individual in an association participates simultaneously in three systems: organizational-technological, economic and microsocial. Each of these systems has its own goals, tasks, methods of implementation and criteria for evaluating results. Even in the most diverse or unrelated functions there is the potential possibility of a conflict (regarding the priority of goals, the content of the tasks, the preferred methods of management and so forth). These initial potential contradictions are capable of becoming a most important source of development of the organization. But sometimes they grow into conflicts which impede the effective work of the organization. The fact is that people are always the bearers of potential contradictions. When engaging in the fulfillment of individual tasks they sometimes encounter sharply emotional interpersonal or intercollective conflicts. As examples one can use Situation 6, which discusses the contradictions between the technological and economic subsystems in one of the construction administrations, or Situation 2, which reveals the organizational reasons for the "stupid character" of the shop chief."

An important practical conclusion follows this theoretical point: the existence of conflict is always an indicator of the functioning of technological, organizational and economic mechanisms. Consequently, when controlling conflict the manager actually controls the entire economic production process, including the equipment, finances and personnel.

The next theoretical point of the authors is that mixing man and the production duties he performs can lead to contradictions between social-personal and functional structures of production. Conflicts that arise because of the intervention of personal relations in organizational functions and which deform production functions must be halted by the manager. The life of people who transform their production activity into a means of clarifying personal relations provides us with many bitter examples.

Of course, in a prolonged, overgrown conflict it is already difficult to find the causes and effects, for each side creates its own "half-truth." But still it is necessary to search for the truth for otherwise the organization is threatened with slow disintegration.

An important result, in our opinion, is the authors' development of the problem of man's position in the conflict. There always arises the question of the role of the individual in a specific situation of conflict: As a representative of "himself," as an official, as a representative of the entire organization or even more broadly--as a citizen? When considering the multitude of positions of man in the organization, the authors introduce an interesting constructive concept of the "power" of the subject in the conflict, defining his official level in the administrative hierarchy. But the desire for maximum "power" does not always guarantee an advantage. For example, one of the participants in the conflict, in order to achieve the goal, acts from the position of an official while his opponent will try to move the conflict to a different level, into the sphere of personal relations, where the chances of winning are equalized.

An undoubted merit of the authors' approach to the problem of conflicts is the ability for further development which it contains. In demonstrating the correctness of their views, the authors consider a multitude of various kinds of situations, earmarking ways of resolving contradictions.

We should like to share some ideas about one of the omissions of the authors. They actually limited themselves to two of the simplest forms of man's activity in the organization: the subject activity and information communication. As a result, the analysis does not include such an essential form of activity as "exchange" in the broad sense of the word. Economic relations are not limited to the sphere of economic activity, but they penetrate into the actions and deeds of each individual and collective. Any things or phenomena can be the subject of economic relations. In a production collective the workers exchange means of labor, services, knowledge and simply signs of respect and attention, and not only purely economic values. This theoretical shortcoming is the more vexing since when selecting situations of conflict the authors emphasize the significance of the economic sphere for relations among people and even utilize the concept of exchange in a

questionable way, but they do not introduce it into the structure of their theory.

We should like to express a couple of ideas about the method used in the book for analyzing situations. As a rule, under real conditions each brain of reliable information concerning the reason for the conflict is acquired with great difficulty. The manager has to overcome the distortion of the facts (involuntary and intentional) on the part of his subordinates, take into account the prejudice of the higher management, create an explanation for the situation, and sometimes discard it.

Therefore resolving a conflict always reminds one of a detective story in which the answer is not clear up until the last moment. From the dialectical point of view it would be expedient not to be too hasty about looking for answers, but to motivate the reader to pose problems and to search independently for ways of surmounting conflicts. Finally, it would be possible to suggest various variants of intervention in the conflict, developing intuition and the ability to make decisions without absolutely definite information.

We recall, for example, the resolution of Situation 3. The capable but psychologically illiterate chief Zyryanov comes to a "poor" shop. He manages to put production in order but the collective does not like him. And they turn their sympathies to the young engineer Golubov. The authors suggest what would seem to be an obvious solution--remove Zyryanov and put Golubov in his place. And they even reinforce this opinion with a happy epilogue: "The situation in the shop was normalized; and the sharp conflicts disappeared."

Possibly under those actual conditions which served as a prototype for the creation of Situation 3 that is what should have been done. But the information that was given does not instill confidence that this solution was justified.

Where is the guarantee that Golubov, in the role of manager, will be capable of demanding of his subordinates high-quality fulfillment of planning assignments and punishing them for inefficient work? Where is the proof that Golubov will succeed in maintaining the level of productivity that has been reached and overcoming the resistance of the group of workers headed by the senior foreman who are interested in undermining the work? Here we encounter an age-old sociopsychological problem of the formal and informal leader. One cannot agree with the simplistic idea that all one has to do is make the informal leader the formal one in order for relations in the collective to improve. It is quite possible that the informal leader is the center of the negative attitude toward the formal leader and the nature of this attitude lies not in the personal characteristics of the manager or his opponent, but in the conditions for production.

In conclusion we should like to emphasize that the authors have filled a most important social order by convincingly showing through their work that the manager does not have the right to avoid a conflict or to resolve it solely by the "surgical" method of firing. Conflicts are inevitable and frequently they are useful for their reveal the weak links in the organizational chain. Only

by discovering the causes is it possible to eliminate impediments to the effectiveness of the operation of the enterprise.

For managers to become familiar with the book by F. M. Vorodkin and N. M. Koryak, a conflict will no longer be a scarecrow, but will be transformed into one of the levers for management.

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11772

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BOOK ON SOCIAL PSYCHOLOGY REVIEWED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 6, Jun 85 pp 203-206

[Review by V. V. Chichilimov, chief of the laboratory for sociological research of the Tiraspol Production Sewing Association imeni 40-Letiye VLKSM, of the book by B. D. Parygin, "Sotsialno-Psikhologicheskii Klimat Kollektiva" [The Sociopsychological Climate of the Collective], Leningrad, "Nauka", 1981]

[Text] Nobody who knows has been waiting as anxiously for this book as plant sociologists and psychologists have. Indeed, everyone holds us sociologists of the enterprises responsible for improving the sociopsychological climate today: the directors, the party committee, the trade union committee, the shop chiefs, the brigade leaders and the foremen. "What have you done to improve the sociopsychological climate and what do you suggest doing?" There are very intelligent working in industry today and there is no need to convince them that good relations in the collective are helpful and that poor ones are an impediment. This already goes without saying. Incidentally, the author of the book himself has for 15 years done a good job of explaining this fundamental truth in his articles. I personally have read these articles from cover to cover. I have used many of his points and I still use them now in lectures for workers and engineering and technical personnel.

Hence the interest in the new book. One must also take into account what was said in the preface--that the work was done by a large group of Leningrad scientists. They enjoy a great deal of authority among plant sociologists. Well, it would seem that they had figured out the problem! For it was written there: suitable for practical use. This would mean that they had taken into account what production needs today.

A review is usually written according to a particular pattern. First the merits and then the shortcomings. It is possible to present both with a superficial argument, reflections and so forth. I wish to violate this tradition. I do not wish to write anything about the merits (there have already been two reviews of this kind). I shall write only about the shortcomings. And so this is not a review at all. It is simply a complaint. And here is why.

When an enterprise produces an instrument, a machine or a tape recorder and places it on the counter, the consumer looks at the main thing: does it work? One can find that it has many merits and some of them will simply jump out: the external appearance, the new materials, the design--in brief, a mass of labor and efforts have been invested. But there is still just one defect--it does not work....

We felt something like this when we read this monograph. It should be noted that generally we are not newcomers. During the past year we have tested about 15 different methods for measuring the sociopsychological climate. Both from our country and from abroad. And we delved into it. Initially the complexity of the work was perceived as something that went without saying--this was necessary because it was something new--but we are stubborn people and for the good of our native collective we will strain our brains and delve into the matter.

We delved into it, and the further we went, the more we became convinced that in addition to the difficulty of assimilation, the initial concept in the book included nothing that was suitable for introduction into practice.¹ Perhaps from the standpoint of academic science there was a good deal to be found in the monograph: the concept, the methods, the analysis, the polemics with the opponents. But domestic and foreign science already know of so many of these concepts for studying the psychological climate! This is approximately the 74th set of methods.

Perhaps it would not be worthwhile for me, a plant sociologist, to take on a review of a work by representatives of academic science if, I repeat, it had not included the phrase: "Suitable for use in practice." After all, on instruments they write: "Do not hook up to a direct current network!" and that is it. Nobody will waste time on it.

On the advance of B. D. Parygin I am supposed to prepare a questionnaire including 146 questions and begin to run around the plant. It is terrible to think about how much of my time this will take and how much time I will take from the workers and engineering and technical personnel (we have 150 brigades!). I have nothing against 146 questions. In academic research, for purposes of reliability, one can even triple this number. But you will agree that in production to process this number of questions just about the sociopsychological climate--is utopia. For along with this problem we need questionnaires about competition, about adaptation, about labor and sociopolitical activity, about leisure, and about spiritual and physical culture. How can we forget about all that?

Let us say that I became clever and processed the questionnaires on a computer and in this way after a while I obtained some elegant climate-o-meters: 150 of them. And what am I supposed to do with them? If I had several brigades I would go to the collective and discuss and explain as much as possible about the measured potentials. What is one to do, however, if there are 150 brigades? How am I supposed to manage to get around to all of them? How do I even get the information to them?

I shall take the extremely successful variant: the measurements are so good that one simply looks at the table and everything is clear: what needs to be done for improvement and how. But even in this case the methods are lacking the main thing: how everything is utilized in practice in the most ordinary collective. It would seem that there could be nothing simpler--you know that here are 10 sets of methods, you have thought of something new taking all experience into account, you have tested them experimentally, and then you have gone into Leningrad plant, into the brigades, tested the methods, and become convinced that in this way and that they will improve the collective, that it is necessary to do this and that. And for your health you have written a monograph--the most interesting would be the chapters and the pages for practical workers! Unfortunately, we readers of the monograph will not find such a simple and completely scientific approach.

Now I shall try to indicate briefly what interests the labor collective in the problematic of the sociopsychological climate today.

In the first place, such an object as the sociopsychological climate dictates the need for operational analysis. Nobody denies the significance of fundamental research--let it be done. But practice today needs methods which make it possible to measure at least the main and essential thing. And this must be done quickly. In hundreds of brigades and divisions at once. What is the climate there, what can be done for operational intervention? If these methods do not exist--do not write that the work is suitable for practical workers. Let us develop such methods.

Second, the sociopsychological climate must be monitored constantly: it changes. Information concerning the dynamics of the changes is needed at least once a year. And the main thing is the method of delivering this information to the specific collective. How and when (they are behind the machine tool for 8 hours (!), in what form and how should the information that is received be presented to the collective? Today it seems that this is a decisive criterion for the practicality and effectiveness of any methods for studying the sociopsychological climate. If this is not there the information will gather dust on the shelves in the form of reports.

Third, when developing the methods it is necessary to understand well that this is not the only social problem for the collective. There are many others that are no less important. From the standpoint of modern management theories, the person who can deal with a multitude of problems well is the one who can reduce this multitude to several that are suitable for management. Any scientist who tries to suggest something to the collective in order to solve social problems should remember this kind of interconnection. For today there is not a single representative of the applied technical sciences who will suggest for a shop a machine tool which will not fit in because of its size or is in no way related to all the other mechanisms and technology.

Let the author not think that we are only criticizing him. We are suggesting to him and his colleagues that the next time when they prepare one more set of methods that before publishing them they give them to us for practical verification in at least one working brigade. We promise to test them conscientiously (we have three graduates of the social psychology department

at Moscow State University and graduates of the psychology departments of Leningrad State University and Kiev University.

FOOTNOTE

1. I repeat that I am deliberately avoiding documented criticism of the content of the methods. This was done convincingly enough, for example, by V. V. Boyko, A. G. Kovalev and V. N. Panferov in the book "Sotsialno-psikhologicheskiy klimat kollektiva i lichnost" [The Sociopsychological Climate of the Collective and the Personality], Moscow, "Mysl," 1983, pp 41-43.

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11772

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SCIENTIFIC ECONOMIC SOCIETY LEADER INTERVIEWED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 6, Jun 85 pp 207-215

[Interview with V. N. Krasilnikov, candidate of economic sciences, deputy chairman of the central board of the Scientific Economics Society, by Ye. Kolosova: "Find Your Place!"]

[Text] More than 2 years have passed since the formation of the Scientific Economics Society. EKO has already written about the tasks which the young society sets for itself and about its structure [see EKO, No 7, 1983]. After this article was published the editorial staff received a large number of letters from our regular readers in which they expressed an interest in the NEO [Scientific Economic Society] today. We offer for your attention a conversation with the deputy chairman of the central board of the NEO, Candidate of Economic Sciences V. N. Krasilnikov with an EKO correspondent.

[Question] Viktor Naumovich, enough time has passed since the day of the formation of the NEO. Tell us, is there not a need to clarify the goals or the forms of the society's work?

[Answer] It is natural that a scientific economics society sets as its main goal active promotion of successful implementation of the party economic and social policy. To speak more concretely, we are singling out two key areas of the practical work of the NEO. These include, first, the development of organizational forms for coordination of the efforts of economists and practical workers in the system of state institutions. Second, there is the agitation and propaganda area of the work.

It is necessary to find a place for real application of the forces of the economic community in our planning, supply and statistical agencies, and also in agencies of state institutions where the drafts of all the directive documents are drawn up. The functioning of the national economy depends on how well they are prepared. We are searching for forms of application of the forces of the scientific and economic community in the stage of preparation of drafts of directive documents, primarily at the "juncture" of the interests

and problems of planning, supply, financial and other agencies. For strange as it may be, even in interbranch agencies to protect the honor of the uniform and to isolate the department. It is precisely in the stage of preparation of the drafts of directive documents that the NEO could contribute to unifying all workers engaged in economic problems at the upper levels of management--including rayon, oblast, republic and union levels. One must say that we have not yet found a sufficiently effective organizational form. We have created powerful sections of the NEO and they have begun to work successfully, in our opinion.

There is one more problem: How to combine the work of the scientific sections and the professional activity of the regular members of the NEO. I think that this is one of the possible ways of uniting science and practice.

The third group of issues involves coordination of the efforts of interbranch management agencies and proportions. We have become convinced that for managers of enterprises and head economists contacts with planning and supply agencies are necessary. Therefore the activity of the magazine EKO in particular, under whose aegis the NEO organized the club of directors--by attracting to its work economists of enterprises and leaders of agencies of Gossnab, Gosbank, as well as party workers--is very promising, in our opinion. We are now thinking about the organizational structure of these ties and how to draw the leaders of industrial enterprises and associations into the local organizations and the oblast, kray and republic boards of the NEO.

The Scientific Economics Society conducts extensive propaganda of scientific and technical achievements in conjunction with the Znaniye Society. Of course we do not want to duplicate the activity of this society, in which the lecture work is conducted on a traditionally high level. Therefore in many republics, for example, in the Ukraine, in the oblasts we have conducted joint plenums of the Znaniye Society and the NEO, where we have clearly determined the subject matter of the lectures of the NEO and the Znaniye Society. In this connection the work experience of the Bashkir oblast board, which conducts weekly television lectures on problems of economics, is interesting.

[Question] But how do you publicize the society itself? The letters that come into our magazine say that far from all economists know about it: "There is no information about the existence of such a society in Riga..." "I read about the NEO for the first time in your magazine. There is a complete absence of information! And this is in Leningrad." "I have never heard that there is an NEO operating in Omsk." "I have never seen any information about an NEO in Tula." "Except for an extremely brief note in ALTAYSKAYA PRAVDA I have never encountered anything about the creation of an NEO." "An extremely useful cause and a complete lack of information."

[Answer] Indeed publicity is fairly important for a young society which is going through the society of establishing itself. It is carried out both by local organizations and in the press. Boards have now been created in 143 oblasts, krays and republics of the country. Our society has about 400,000 individual members, and 10,000 collective members. This indicates the large amount of serious propaganda for the society which has been conducted by our activists with the support of the ministries and departments. But, of course,

there is a great deal left to do. We are being assisted by such periodical publications as EKONOMICHESKAYA GAZETA, VOPROSY EKONOMIKI, PLANOVOYE KHOZYAYSTVO, FINANSY SSSR, DENG I KREDIT and, of course, EKO. And the magazines EKONOMIKA SOVETSKOY UKRAINY and EKONOMIKA SOVETSKOGO KAZAKHSTANA has introduced a permanent column--"In the Republic NEO Board." In our opinion, these and other similar republic magazines could be made publications under dual jurisdiction--the republic gosplan and the republic NEO board.

[Question] The propaganda for the society would probably be more effective if the NEO had its own printing base and possibly its own magazine. Our readers, for example, from Alma-Ata, write about this.

[Answer] Indeed, without a printing base we are unable to distribute interesting statements and reports which are heard at our conferences for all of the local organizations or supply them with methodological materials. In the central board the NEO has created on a public basis an editorial-publication division which, thanks to help from the editorial staff of EKONOMICHESKAYA GAZETA, has prepared for publication the first issue of "Information Bulletin," but we agree with the EKO readers that the time has come to create a permanent press organ for the central board of the NEO. Such a magazine would not only publish theoretical articles without duplicating other economic magazines. In our opinion, it should be of a theoretical-applied nature where it would be possible to find a unionwide tribune for advanced practice of the economic community and where it would be possible to publish the results of scientific research and methodological materials. Incidentally, as of today the majority of scientific and technical societies have their own press organs which make their work considerably more effective.

[Question] Certain of our readers are writing that they do not have a completely clear idea of what the Scientific Economics Society does. "Unfortunately, so far the influence of the NEO is not being felt on the economic life of Moscow." "The NEO does not influence economic life, although a local organization has been created at the Ural Scientific Center." "The influence of the NEO in Tashkent is negligible." Although there are also letters of the other kind: "The NEO does have an influence and we shall develop and strengthen it" (letter from Novosibirsk). "As the scientific secretary of the oblast NEO board I can say that it does have a certain influence on the life of the oblast" (letter from Alma-Ata).

I shall discuss the main directions of the work.

Improvement of the organizational structure of the administration at all levels and in all units of the national economy. The NEO section entitled "Organization of Management of the Economy" (chairman--G. Kh. Popov) is perhaps working most creatively and efficiently in the development of these problems. It has held a number of large coordination conferences, meetings and seminars both on the development of the organizational structure and on the management of the activity of labor collectives and the development of principles and methods of management.

The section is working fairly closely with the giant of our industry--the Kama Automotive Plant. A confirmation of this is a conference conducted at KamaZ

on management of large production complexes. In 1983-1984 this same section conducted the first all-union competition for the best published work in the area of organization of management of the economy.

Improvement of the system of planning of the national economy on the basis of the requirements for increased socioeconomic effectiveness of public production. Working actively in this area is the section for planning the national economy of the central board of the NEO (it is headed by Prof V. Yu. Yakovets) and similar sections of local boards. It should be noted that through the efforts of this section they are preparing and sending to the departments proposals for target program methods of planning and for comprehensive scientific-technical and large national economic measures.

Increased effectiveness of the entire totality of levers and stimuli of the economic mechanism, including price setting, the credit and finance system, and methods for evaluating the results of economic activity. The section entitled "Finance and Credit" (under the leadership of Prof N. G. Sychev) held a conference with representatives of bank and financial services entitled "The Role of Finances and Credit in the Implementation of the USSR Food Program." The concrete recommendations adopted by the conference are directed to the state agencies.

The section entitled "Prices and Price Setting" conducted a meeting entitled "Stimulation Through Prices of Comprehensive Utilization of Ores of the Kovdor Deposit." Letters were sent to the USSR Gosplan, the Ministry of Ferrous Metallurgy and the USSR State Committee for Prices with concrete suggestions regarding a number of issues. Almost all of them have been introduced into practice. The State Committee for Prices announced that it is putting into effect additional payments for complete extraction of components in iron ore concentrate and for improvement of the quality of apatite concentrate. The Ministry of Ferrous Metallurgy has announced that it has agreed with the suggestion to establish stable normative formations of funds for economic stimulation for each thousand rubles' worth of commodity output produced from side minerals and wastes from production. The Gosplan included questions raised by the central board of the NEO in its directive documents.

These and like forms of solving important national economic problems should also be investigated by us in the future.

The central board conducted a plenum and determined the concrete forms of participation in the large-scale economic experiment for expanding the economic activity of industrial enterprises and increasing their responsibility for the results of their work. It declared an all-union competition of local NEO organizations in financial, bank, statistical and other state institutions for the concrete contribution to conducting the experiment. We in the central board received numerous suggestions from the local areas concerning conducting this experiment, which we have generalized and sent to the commission for the overall management of the experiment.

The section entitled "Economics of Labor and Labor Resources" (it is headed by Prof Ye. G. Antosenkov) has prepared suggestions for analyzing factors in increased labor productivity. This same section is conducting research on

problems of improving brigade organization of labor. Similar research is also being conducted locally. Thus in the Armenian republic board of the NEO they have developed standard methods of increasing the effectiveness of brigades and wages under the conditions of large-series and mass production of electrical equipment. They have been accepted by the Ministry of the Electrical Equipment Industry and are being introduced at electrical light bulb plants of the country.

With extensive discussion of the law concerning labor collectives the sections for political economics and administration have made a number of suggestions to the central board. We have sent them to the Secretariat of the Presidium of the USSR Supreme Soviet. Many of them were taken into account in the text of the law concerning labor collectives.

[Question] One of the letters contained this statement: "Alienation of the NEO from the industrial enterprises makes its work less effective." Viktor Naumovich, what are your ties with the industrial enterprises?

[Answer] You see, our society is the society of the trade union of state institutions. In the base system of the NEO (both the Ministry of Finance and the Gosplan) are many industrial enterprises. Today we are preparing the question of transferring the functions of the scientific and economic councils of the enterprises to the local organizations of the NEO. But we are not forgetting about the industrial enterprises of other branches. Thus for the directors of 50 industrial enterprises in the Moscow area we conducted a "day of the director." It included meetings with scientists and discussion of crucial economic problems. Interesting work has been created by the Saratov board of the NEO, which created a card catalogue of advanced practice in mechanization and automation of production and in the introduction of the achievements of scientific and technical progress. This is actual assistance for party and trade union organizations of the oblast in generalizing advanced experience.

[Question] The geography of the NEO is truly large-scale. From the western borders of the country to the extreme eastern regions. How is the central NEO board linked with the oblast boards? Our readers are writing about the weakness of this link. Even this letter came from Yerevan: "Does EKO plan to render methodological assistance to the NEO?" Our magazine, of course, does not plan to do this. But what does the central NEO board intend to do in this area?

[Answer] First of all we are generalizing the work experience in the local areas and we are sending this material to all republic, oblast and kray boards. Thus we generalize the work experience of the Rostov and Donetsk oblast NEO boards. We also listen to reports about the work experience of local organizations. For example, the Central Statistical Administration of Latvia, which has developed interesting methods for organizing socialist competition in statistical agencies. We think that this could become the basis for standard methods. This is real assistance for trade union agencies. We are not replacing them in the organization of competition, but our duty is to develop methods.

The sections of the central board are developing standard provisions concerning analogous sections in the local areas. Both members of the central board and our active public workers are frequently out on business trips. These trips are not only to and from Moscow, but also among oblast, republic and kray boards. In 1983 there were more than 1,500 of these business trips.

The other side of our interrelations is what we receive from the local boards. How, for example, did they prepare for the plenum on the results of the economic experiment? Previously we received from the local boards their suggestions and information about the experiment. We received rich material which was generalized and submitted to the central commission for general management of the economic experiment. It was through the NEO that they received, for example, the suggestions from Kurgan Oblast and other boards. All of the suggestions coming into us are serious and fundamental. For the local boards are headed either by scientists or by practical workers who have a large amount of work experience and a profound knowledge of economic activity. All information is drawn to them.

[Question] The society will probably not be able to carry out its functions on a sufficiently high level without support from the country's leading economists....

[Answer] That is indeed true. We are glad that from our first steps the NEO central board has been headed by an academician of the USSR Academy of Sciences, T. S. Khachaturov. The Novosibirsk oblast board of the NEC is headed by Academician A. G. Aganbegyan. The chairmen of the sections of the central board were VASKhNIL Academician V. P. Mozhin and V. A. Tikhonov. The section entitled "Economics of Scientific and Technical Progress" is headed by a corresponding member of the USSR Academy of Sciences, L. M. Gatovskiy, and the section entitled "Economics of Material and Technical Supply"--by the deputy chairman of the USSR Gosplan, A. N. Lebed. The aktiv of the scientific and economic community has a great deal of scientific potential. It includes many academicians, corresponding members of the academies of sciences of the USSR and the union republics, professors, doctors and candidates of sciences, tens of thousands of scientific workers, and a large detachment of highly skilled specialists from state institutions.

[Question] What tasks on the organizational plane are you setting for yourselves today?

[Answer] One must say that our society was created literally from nothing. We did not always have sufficient premises and we do not have them everywhere, the organizational mechanism is insufficiently arranged, and accounting is not arranged the way we would like it. But these difficulties can be surmounted.

We still do not always maintain close contact with trade union agencies. We do not have enough methodological materials. Perhaps this is why the forms of work of scientific and technical societies are transferred to the NEO in pure form.

Much more important is the fact that today the NEO is essentially an interbranch society. On the one hand, this is good. But it is difficult to

set clear-cut general tasks for all of its local organizations. Therefore we devote a great deal of attention to training the aktiv. Very important for developing scientific organizational work of the republic, kray and oblast NEO boards with the seminar in the city of Vladimir with representatives from local boards and their deputies, in which workers and the aktiv of the Scientific Economics Society were addressed by managers of planning, financial, bank, statistical, supply and other agencies of state institutions, the Central Committee of the Trade Union of State Institution Workers, the All-Union Council of Scientific and Technical Societies, and representatives of scientific sections of the central board of the NEO.

The central board of the NEO is always concerned about the activity of the local organizations--the foundations of the Scientific Economics Society. They decided to create an NEO passport which would reflect the entire range of problems which the society can solve.

[Question] And so we can sum up certain results of our conversation. The young scientific economic society is a large force if it is utilized effectively and if it sets concrete tasks for its local organizations. This attraction to participation in solving concrete economic problems facing our city and oblast is felt in the letters of many EKO correspondents. Probably holding seminars and conferences cannot remain the predominant form of work of the NEO.

A good deal depends on those people who are in charge of local, oblast and republic NEO boards, on their initiative and their informal approach to the matter. For the work is being done on a public basis. To see a concrete problem at your enterprise and to solve it through the forces of the NEO--it would seem that this kind of approach would increase both the society's effectiveness and its authority. At various levels the societies should use various forms of work. The Scientific Economics Society still has a good deal to work on, is it no true, Viktor Naumovich?

[Answer] Of course there are problems, but they can be solved. The main conclusion from these 2 years is that we have confirmed the great desire of the public to participate in the work of such a society.

[Question] And in order to help it to establish contact with the central NEO board, we are publishing its postal address: 117259, Moscow, Bolshaya Cheremushkinskaya, 34.

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ROLE OF PSYCHOLOGY IN ECONOMICS INVESTIGATED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 6, Jun 85 pp 215-218

[Article by A. I. Sadikov, candidate of economic sciences, Moscow Institute of Administration imeni S. Ordzhonikidze (Moscow): "Economics and Psychology"]

[Text] In 1984 in Zvenigorod they conducted an all-union scientific symposium entitled "The Role of Psychological Factors in Intensification of the Economy." It was organized by the Committee for Problems of Management of the All-Union Council of Scientific and Technical Societies, the Moscow Institute of Management imeni S. Ordzhonikidze (MIU), the Institute of Psychology of the USSR Academy of Sciences and the All-Union Society of Psychologists, the Academy of the National Economy under the USSR Council of Ministers (ANKh), Moscow State University imeni M. V. Lomonosov, the Plastmassi Scientific Production Association of the Ministry of the Chemical Industry and the Kurganpribor Production Association.

We shall single out two main reports: the joint report of the corresponding member of the USSR Academy of Sciences, director of the Institute of Psychology of the USSR Academy of Sciences, B. F. Lomov, and professor, head of the department of the MIU, A. V. Filippov, and also the speech by the corresponding member of the USSR Academy of Sciences, chief of the problem laboratory of the USSR Academy of the National Economy under the USSR Council of Ministers, P. G. Bunich.

In the report by B. F. Lomov and A. V. Filippov they designated the main areas for concentration of psychology and economic sciences in solving the problem of intensification of the national economy. The authors include among them:

the formation in man's awareness of the concepts and ideas concerning production relations. The psychologists should explain which factors contribute to objective reflection in the awareness of real relations and when distorted ideas are formed. Economic training should be constructed on the basis of this kind of research;

investigation of the labor force as human capabilities. This is required by the task of the development of all resources of the individual, which is of immense social significance. For example, in order to extent the brigade form

of labor organization, along with the creation of economic and organizational conditions, it is necessary to take into account purely individual, psychological factors;

a study of man along with his needs, interests and motives for activity. In the existing methods for incentive, most of the attention is devoted to the organizational aspect of the problem, while the stimulating influence is largely determined by the structure of the needs which depend essentially on the individual psychological peculiarities of the personality;

the formation of reasonable needs as a constituent part of the formation of the comprehensively developed personality. In particular, the study of sources of the consumerist and accumulative psychology and ways of eradicating it. Investigation of sociopsychological patterns in order to predict the demand;

study of the influence of psychological (including sociopsychological factors on the processes of innovation;

further investigation of psychological problems of management.

P. G. Bunich noted that economists are coming closer to lawyers, sociologists and representatives of the technical disciplines and that there are significant unutilized possibilities of fruitful cooperation between economists and psychologists. The speaker went on to describe the main contours of the improvement of the economic mechanism and singled out issues which require joint efforts. In the opinion of P. G. Bunich, economists and psychologists should develop research on the motives which move people to work and the sources of their competitiveness. It is necessary to have a psychological classifier of motives for labor activity and a hierarchical system which ranks man's needs. Also of interest are the little-studied psychological stimuli which arise when an individual feels that he is the master in production. This is especially important under the conditions whereby the role of labor collectives is increasing and socialist self-management is developing. A socioeconomic analysis of small groups that are functioning in various socioeconomic systems is crucial.

At the symposium the investigation of the innovation process was included among the most important areas for joint activity of psychologists and economists. This was discussed, in particular, by doctor of philosophical sciences N. I. Lapin (Institute of Philosophy of the USSR Academy of Sciences].

Innovation activity is a special type of activity to which the particular psychological type of the individual corresponds most. A large proportion of the workers are oriented toward productive activity. For productive activity--the creation of new goals, means, products and so forth--it is necessary to have special training which utilizes active methods of teaching and extensive application of business games. The predominance of reproductive activity is largely conditioned by the objective economic mechanism which is not adapted for radical innovations. As a result, innovations for improvement are considerably more prevalent than radical ones.

Doctor of Psychological Sciences Ye. S. Zharikov (ANKh under the USSR Council of Ministers) drew attention to the fact that the psychological approach to processes of innovation presupposes disclosing internal barriers on the path to the introduction of innovations and on the path to the formation of an economic mechanism which would stimulate the utilization of the achievements of the scientific and technical revolution. It is important to reveal the dependency between the system and the people who are called upon to improve the economic mechanism and their orientation, installations, capabilities, motives, ethical qualities and so forth.

Candidate of Psychological Sciences G. I. Ilin (MIU) pointed out the need for more precise differentiation of the currently too general ideas about "economic" man (the Soviet worker, the laborer, the kolkhoz worker and the employee). The creation of a real typology of people in terms of their economic peculiarities and its utilization in economic practice would make it possible to eliminate the disparity between the abstractly understood consciousness and the concrete economic interests of the worker, a disparity which many of the speakers pointed out.

Doctor of Philosophical Sciences V. A. Yadov (Institute of History of Natural Sciences and Technology of the USSR Academy of Sciences) stated that, according to repeated sociological investigations during the past 15-20 years, the dominant interests of the individual are becoming somewhat routine and there is a violation of the optimal balance between public-production and family-daily life orientations.

The speech of the division chief of LITERATURNAYA GAZETA, A. I. Levikov, was focused on the problem of motivation for labor. The speaker emphasized the complexity and breadth of the concept of interest, which goes far beyond the bounds of purely material issues. As an example he gave the experience of the Kaluga Turbine Plant, whose collective for 10 years now has been producing a 2.5-fold increase in labor productivity as compared to the average for machine building, while increasing the average earnings by only 4 rubles a year and without any sociocultural advantages, particularly housing which, of course, is not a merit of the incentive system. But here the workers are actually participating in the management of the enterprise since brigade labor organization is not reduced to collective piece-rate work, but essentially expands the rights of the brigades. The labor collectives are boldly suggesting variants that are different from the opinion of the administration, they are feeling confidence in themselves and they are experiencing a feeling of being equal masters of production. As a result, with significant intensiveness of labor, personnel turnover does not exceed 6 percent and is the lowest in the country. One is forced to ask the question of how such high results can be achieved by combining a favorable socioeconomic climate with generous stimuli.

In the main points of the report by Candidate of Economic Sciences A. N. Kuritsyn (MIU) he analyzes the sociopsychological methods of personnel management in Japanese companies, particularly the essence of the concept "firm--unified family," the system of "career planning," and the work of "groups for quality" in Japanese corporations as well as the practice of

hiring workers for life. He made a comparison of the Japanese and American decision-making mechanisms. Related to these problems is the presentation by Candidate of Economic Sciences M. M. Kreysberg (MIU) concerning the psychological factors in strategic economic decisions in foreign firms.

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11772

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WORKER RIVALRY SATIRIZED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 6, Jun 85 pp 219-222

[Article by Yegor Belyayev: "I Expelled Him!"]

[Text] Leonid Yuryevich (a laboratory chief who is no better than I am) greeted me on the street for the first time. He had not greeted me since I spoke not altogether confidently at the pre-defense of his dissertation. I had already become accustomed to the fact that when he saw me he would drop his eyes, look at his legs or gaze at a little bird in the next tree.

Imagine someone who has not greeted you for 2 years and suddenly he comes out with a crisp, well-articulated, "Hello," accompanied by a bow and a smile. Anyone would start to wonder.

I arrived home with such an expression on my face that my wife shouted: "What happened?" Having heard about the mysterious incident, she immediately began to make suggestions. She has the opportunity to obtain a season ticket to a swimming pool where Leonid Yuryevich's wife should want to go. Well isn't that funny! How does he know that she wants to go to the swimming pool and how can he know that we have the opportunity? My wife became confused and disoriented, and finally she became offended and went to sleep.

I was left alone with my murky thoughts. He greeted me. It would not seem that anything serious had happened. But something must be behind this. One must does not start greeting a person again out of the blue. People who are intelligent and principled in general do not do anything without a reason. It is some step. But in which direction?

Stop. But if you meet him halfway? We will settle the two sides: an explanation of the reasons and constructive conclusions. Trying not to wake my wife I walked through the bedroom, and took up a pen and a sheet of paper. On my way back I bumped into a chair and my wife began to mutter. "Go back to sleep if there is nothing I can do."

In the kitchen I put on some water for coffee. I sat down at the table and divided the first sheet of paper with a vertical line. On the left I wrote down "Potential Reasons" and on the right--"Constructive Conclusions." But I

thought about it and added on the left in quotation marks: "Why does he need me." I entered the question mark. There turned out to be more headings than for two articles.

The water started to boil. I made Turkish coffee. After the first swallow the ideas spread across the paper from the vertical line to the right side. Surprising possibilities opened up. In the first place, we immediately agree about the division of the sphere of research. During the past 2 years the subjects have come very close together. I have not been able to sleep in peace: has he suddenly received something better? If tomorrow he greets me again I will go right up to him and say: "Leonid Yuryevich, would you like me to tell you what Nikushina is doing?" I will tell him flatly that she is duplicating the work of his graduate student. I will promise to direct her to something else.

But why show my hand too early? It is not a big thing to greet someone. He thinks that I will immediately show my trump. I have not descended to that. The work area will not change arbitrarily. Try to find out the reasons in the scholarly council.

I finished drinking the warm coffee and crossed out the first constructive idea. But the economic agreement is another matter. How much better we would live if instead of two agreements we had concluded one large one. Now everyone as to write four reports a year, and it would have been possible to write only two. For instance he could write them in March and September and I in July and December. It would be good for everyone and it would make no difference to the client. This is the effect of simple cooperation.

Or I could go up to him and say: "I hope for close cooperation and that we can forget about our mutual complaints." He will not take it seriously. And he will take it as a joke. And he will not understand about the agreements. He will say that I am trying to finagle it so that I will get my vacation early and return just when it is time to pick mushrooms.

I crossed out the suggestion about the agreements. Let us take a look at how events will develop. On partial issues it would be possible to arrange cooperation even now. The institute competition is just ahead of us. We not only can but should come to an agreement. I will put up only my best against yours, and you do the same thing with mine. On the right half of the paper, on which there was already scribbling, I wrote "Competition" and put a question mark next to. After all, if we joined forces the institute competition will always give us at least third place. The devil made me speak at that predefense. I have lost 2 full years.

The agreements in general are shady business. Everything written in the report is exclusively on the author's conscience. But you are not really the author. To copy something is not really plagiarism because it is for the common cause. If we divide up the times an argument will start. Another matter is the graduate students. One-time agreements regarding names. I will stand up for yours and you stand up for mine. A testimony to honest and strengthening of mutual confidence. It is best of all to start with them. I wrote the word "graduate student" on the right side.

One "classicist of science" K. agreed with another "classicist" L. that his graduate student M. would pass, and then another graduate student would pass no less successfully. They agreed and everyone voted "in favor" but the poor graduate student was left out. The gentlemen quarrel, but there is no sweat on their brows. I thought about it and then crossed out the words "graduate student." So what is left? He greeted me and I do not see any possibility of turning this event to my advantage? A disgrace!

But we shall not digress. Perhaps along the line of public organizations? The chairman of the housing committee is from the laboratory L. Yu. Everyone says that he builds a three-room full-scale apartment for his chief. I could have raised a stink but I did not. It is a pity that they did not value this. So many good deeds remain hidden in the shadows!

Let us leave the housing commission in the shadows, too. Why do I need it, even L. Yu. received everything he could out of it without shaking public opinion. What else is there in the local committee? Passes. Here we do not cross paths; he has a stomach and I have a heart. Different dioceses. It is terrible but there are no ties that are worthy of studying.

Is this really the domestic commission? Previously such commissions engaged in the moral image, but now there are not enough of them. Regardless of the image, suffering people crowd around them. But a person would still think about spending 200 rubles on a cap. But in the waiting line from a list that was 2 years old they were gathering around and making noise. Even I, without thinking, purchased-- The waiting line appeared in my mind. A slight suspicion flickered and disappeared. Becoming stronger, it appeared again within 10 minutes.

This version should be checked. I went to the bedroom, to the looking glass. I put on a new hat in front of the mirror and almost laughed. A T-shirt, pajama bottoms and a hat. I returned to the entry hall, put on a coat, wrapped my neck in a scarf and again went to the mirror. It was different.

"Where are you going so early?" muttered my wife. "I am going to bed," I placated her. "In a coat?" she was surprised. "At least take off the scarf."

Inappropriate jokes. When I turned toward the mirror everything seemed different. On television they were showing an automatic camera, but they did not explain the principles of its operation. I would have clipped the strip off the photo in any case.

"You should have put on glasses, too," my wife would not leave me alone. But what? She was right. The sun flickers, the snow sparkles.

When she saw that I was putting on glasses my wife sat there calmly hugging a pillow. I did not have any time for her. From the mirror I could see our deputy director, Ivan Maksimovich Shalimov looking at himself. This is the person you greeted, dear Lenechka, a case of mistaken identity. Serious conclusions can hardly be drawn from your mistake.

"What is the matter with you? Should I pour you some medicine?" my wife asked, continuing to squeeze the pillow to her body. Without answering I undressed and lay down to sleep. I went to sleep satisfied. I had still expelled him!

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September 17, 1985